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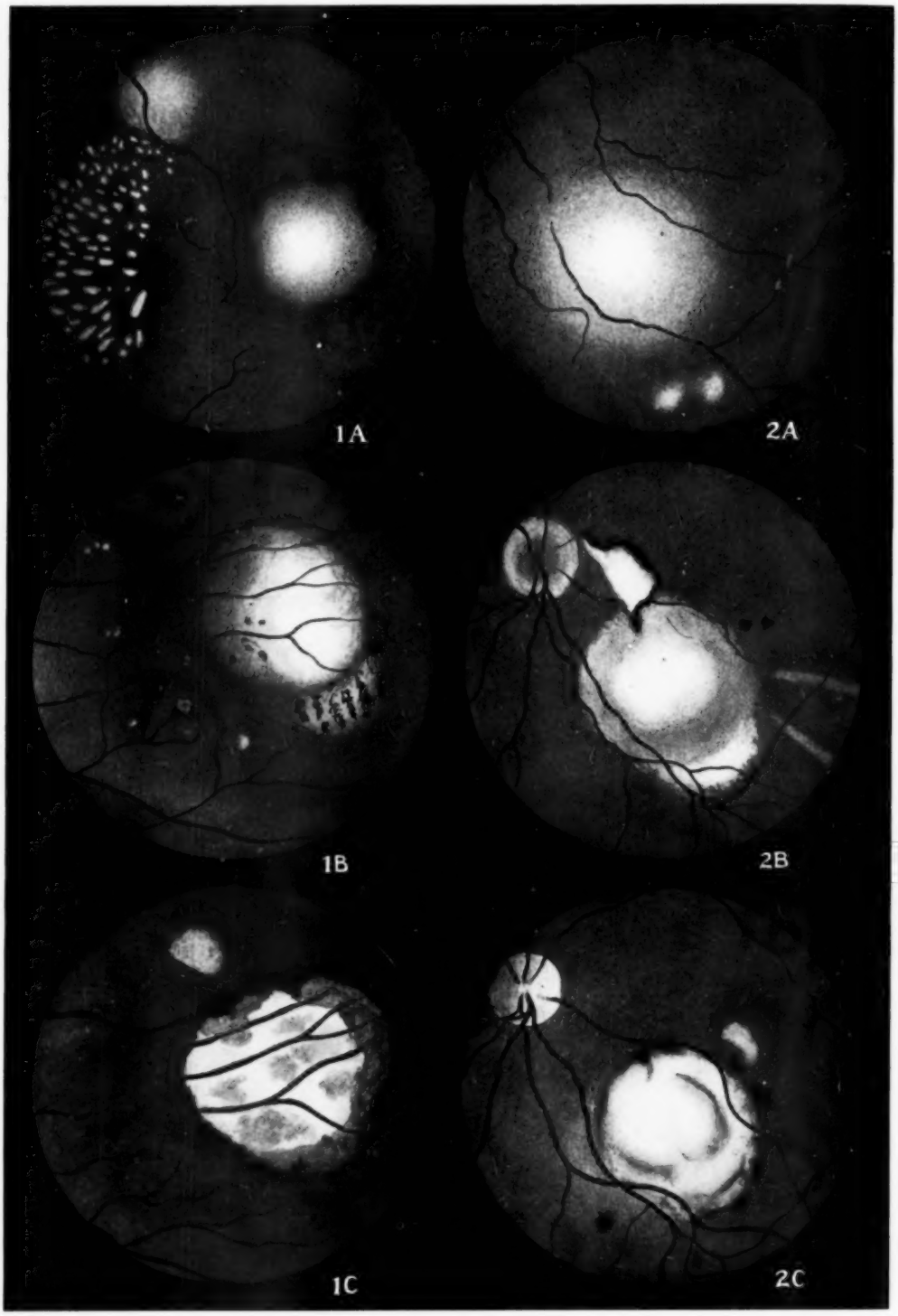

TUBERCULOSIS OF THE EYE (RALPH I. LLOYD). CASES 1 AND 2. (SEE PAGES 764 AND 765.)

AMERICAN JOURNAL OF OPHTHALMOLOGY
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TUBERCULOSIS OF THE EYE

RALPH I. LLOYD, M.D., F.A.C.S.
BROOKLYN

The various manifestations of tuberculosis within the eye are described, and a number of them are illustrated, either in the text or the color plates. The value of the slit-lamp in cases involving the anterior segment is emphasized. A number of case histories are reported, and an extensive chronological bibliography is appended.

"The iris generally becomes first of all whitish at some point of its extent, and then rises into a tumor, which assumes a yellowish color, with red vessels ramifying over it. Sometimes such a tumor suppurates, and bursts through the sclerotica, after which the eye becomes atrophic. . . . . The posterior part of the choroid is sometimes the seat of a tumor. It separates the membrane into two laminæ, between which it is deposited. Much more frequently have non-malignant growths been observed in the anterior part of the choroid." (Delarue. Cours complet des maladies des yeux, p. 206; 1820.)

As early as 1711, descriptions of typical cases of tuberculous disease of the eye can be found in the literature, but the first studies of the disease were made early in the nineteenth century. The ophthalmoscope had not yet appeared, so the history of the case and the course of the disease assumed a greater importance in making the diagnosis. If a grey mass appeared in the pupil of a small child, the diagnosis of medullary sarcoma was made, but, if the child remained in good health despite rupture of the globe or phthisis bulbi, it was considered a medullary growth aborted by tuberculosis. This was a clinical process entirely.

Some of the cures of fungus hematodes were really the doings of nature and set off the characteristics of tuberculous eye disease in striking fashion. Limitation of the disease to the organ or part of the organ affected; the absence of pain, inflammatory signs and local reaction; and the recuperative powers of young patients in good health, are all characteristic of this form of eye trouble.

A quotation from Prael's article, "Observations on false tumors of the eye", published in 1830, is worth reading at this point. A healthy, well nourished child had had several convulsions at the end of her first year. "Some weeks after the convulsions, the child lost its customary happy temperament and the left eye began to tear, while more careful examination showed it very sensitive to light. No inflammation was present, the vision was lost and the blue iris irresponsive to light and hyoscyamus. The normal looking pupil neither contracted nor dilated. In the pupil, I noticed a greyish fluorescent shadow that reminded me of Beer's amaurotic cat eye. Some weeks passed when from this shadow grew a mass, gradually increasing in size until a rounded, straw-yellow mass lay close behind the pupil, over which ran varicose branching vessels. An unpracticed eye would say that a cataract was present; a very natural error because of the normal appearance of the iris and the eye. The diagnosis was in doubt because my colleagues and I could not harmonize the healthy condition of the child with medullary sarcoma. The mass vegetated until the iris was pressed against the posterior corneal surface but without change in color, by a mass resembling a distended sail. Meanwhile, photophobia and lacrimation increased,

the varicose vessels increased in size and number while the sclera remained pure white but the cornea became cloudy and staphylomatous knobs deformed the eye. . . . . To my wonderment, the disease reached its climax with the corneal changes. The process halted, improvement began and the child cried less and was quieter. The cornea flattened, the bulb decreased in size and, finally, atrophy of the globe closed the case".

In contrast with these clinical experiences, Virchow, Cohnheim and others demonstrated tubercles of the choroid in children dying of miliary tuberculosis, on the autopsy table. Gerlach, in 1852, demonstrated such a choroidal preparation under the microscope, and a few years later Manz compared microsections of suspected eyes with sections from the lung and proved that the pathologic features of the two specimens were similar.

After the ophthalmoscope was introduced, miliary lesions of the choroid were well studied and several instances of establishing the correct diagnosis by ophthalmoscopic examination of cases in coma, with doubtful diagnosis, are to be found in the literature.

Villemin injected material from tubercles under the skin of rabbits, and at autopsy showed the specific lesions. In 1877, Cohnheim transplanted a bit of tuberculous tissue into the anterior chamber of rabbits and studied the development of the disease. Hänsel, Samelsohn, Baumgarten and Leber repeated this experiment, and in 1884 Haab first demonstrated the presence of tubercle bacilli within the eye. Reismann, Wadsworth, and Lawford repeated this demonstration within a year or two. Among the first to study the clinical aspects of tuberculosis of the eye was Graefe, who, with Leber, issued an important contribution in 1868. Jaeger introduced a very good illustration of tuberculous lesions of the choroid in a near-sighted eye in his Atlas the next year and it is interesting to note that this combination is again attracting attention during the last few years. During the next score of years large choroidal lesions and their similarity to gliomas were studied.

In 1896, Simon called attention to tuberculous disease of the retinal vessels as a cause of intraocular hemorrhages in young people. Iritis, iridocyclitis and uveitis and the proliferating forms of the disease in the vitreous chamber came into prominence, but the profession has been loath to accept the idea that tuberculosis of the eye is at all common. Not until Axenfeld and Stock published their classic in 1911, did the connection between retinal hemorrhages and tuberculosis seem to impress the profession.

Harms also made a very important contribution to this subject by demonstrating tuberculous periphlebitis. The introduction of the slit-lamp has done much to teach the profession that there are many cases of iritis, uveitis, chorioretinitis, and lesions of fundus vessels that are certainly tuberculous and that many so-called focal infections are really tuberculosis. In addition, most of the cases of heterochromia iridis, and many unilateral cataracts in young persons (even some in the fifth and sixth decades) can be explained only as the results of long standing, low-grade tuberculous disease of the ciliary body or choroid. The outstanding features of eye tuberculosis are its limitation to the part of the eye involved, the tolerance of the eye to a severe local process without serious pain or redness, its insidiousness of onset in some cases and its sharpness of onset in others, its chronicity and tendency to relapse.

The latter trait is almost always but an aggravation of a condition that has only apparently ceased, but, if our examination had been searching enough, in this apparently normal eye would have been found deposits of fibrin on the posterior surface of the cornea in the form of fine bits or round masses, perhaps an occasional nodule on the iris margin, vitreous floaters, and even mild changes at the posterior pole of the lens in the subcapsular zone. These may continue for years without redness of the eye or any complaint by the patient, except for poor vision. Many

cases of so-called healed central and disseminated choroiditis belong to this group; as do also some of the cases diagnosed as congenital, extrapapillary coloboma.

Cases of the severer type resembling fungus hematodes have never come to my attention, but several cases with large yellow-white waxy masses in the anterior chamber with many iris nodules and perforation near the limbus have been observed (but only in colored people, who seem especially susceptible to severe eye tuberculosis. In one such case, spontaneous perforation near the limbus occurred with but little complaint by the patient.

The disinclination of the profession to accept tuberculosis as a frequent causative factor and their preference for focal infections as the chief factor may be explained by the reasonableness of the method of spread in the supposed case of focal disease and the mistaken assumption that lung tuberculosis is similar to the same disease in the eye. The ordinary picture of pulmonary tuberculosis is a late stage of a disease beginning as a pure tuberculous infection of the lungs or bronchial lymph glands, and which does not attract attention as a rule until a secondary infection has caused suppuration and other destructive features that give the clinical signs by which we recognize the disease. Rarely inside of the eye do we have secondary infection by streptococci and staphylococci.

Pulmonary tuberculosis is often featured by lesions ulcerating into small vessels, and eminent pathologists have pointed out the tendency of the disease to spread by emboli from such an ulceration. Miliary tuberculosis may be of just this origin and it is certain that some fundus lesions are embolic. For this reason, we should consider tuberculous eye cases as victims of tuberculosis in some organ like the lungs or the bronchial lymph glands originally, with the eye lesion secondary thereto and but a part of the whole disease; not a disease by itself.

It is the author's conviction that most of the so-called focal infections of the eye are really tuberculosis and that as time goes on we shall hear less and less of the former diseases and more and more of the latter. This is no reason why diseased tonsils and adenoids should be neglected; nor should infected teeth, diseased gall-bladders, fallopian tubes or seminal vesicles be passed over as inconsequential. The patient must be restored as near as may be to health, for only by building up his resistance can we hope to protect him against relapses and further ravages of the disease.

It is not unusual to observe the complete recovery of a young man with a single large choroidal lesion or several small ones, with the exception of the scotoma caused by the scar. As he grows older there are relapses which become more and more unyielding until finally, after middle life there develops a chronic state with total loss of vision of the affected eye. Moreover, pleurisy with effusion, tuberculosis of the peritoneum, or meningeal lesions often cause a fatal conclusion. None of these are hypothetic instances, for each has been observed in cases coming with a disease limited supposedly to the eye.

There is one disease with which tuberculosis of the eye may be confused; it is syphilis. While syphilitic iritis is rather common, it should not often cause difficulty in diagnosis. It is so sharp and severe when compared with the other disease, that it stands by itself. Gumma of the iris is much more rare than tuberculosis and will yield readily to neosalvarsan. Syphilitic disease of the choroid and some of the more chronic forms of iritis may puzzle the most experienced clinician. In inherited disease and during the early stages of the acquired form the Wassermann test is often negative.

In inherited syphilis one may have Hutchinson teeth, and in this connection the condition of the first permanent molars should always be considered as important as that of the central incisors. Inherited syphilis seems to influence the teeth during the first, and part of the second, year of extrauterine life. During this period, enamelization of the

first molar, of the central and lateral incisors, and of the first bicuspids of the second set is going on. The order of intensity of the effect of inherited syphilis upon the mentioned teeth is as they stand in the sentence. We have been in the habit of looking at the incisors, but the mulberry crown of a syphilitic first molar is too little known. Tuberculous disease or any other serious sickness during the first year of life, will affect the enamel of these same teeth but in a quite different way.

Dactylitis is another condition found in hereditary syphilis and also in tuberculous disease. The tuberculous fingers of young people often suppurate in a mild sort of way but the syphilitic types do not. Inherited syphilis may also cause hyperplastic synovitis of the wrist, knee and ankle joints, often mistaken for rheumatism, but there is no suppurative process as in tuberculous joints. Another condition found in young subjects in both inherited syphilis and tuberculosis, is advanced sclerosis of the temporal vessels. This may be seen in young people of sixteen years or even younger.

One of the unfortunate results of the common use of the x-ray and the laboratory is a decline in the skill of physicians in making examinations of the chest. To the highest skill in this time-honored procedure should be added the x-ray and the laboratory, for in the difficult case we need them all. Often in the tuberculous case the evidences of healing of the old processes seen on the x-ray film are called pleuritic or pneumonic because the patient recovered. Adhesion between the diaphragm and lung base is one of the most important indications. Similarity of inherited syphilis and tuberculosis is at times baffling; the two diseases may even coexist in the same patient, in which case a rapid decline to a fatal ending is the rule.

Almost all the fundus lesions of tuberculous origin are located in the choroid, but there are cases which seem to be limited to a retinal vessel. This would suggest embolism or thrombosis, but proof will be difficult.

A phlebitis of the retinal veins is described by Harms and others, and the hemorrhages in young people and even in older adults are explained as due to disease of the vessel wall ending in rupture. This is not a parallel of the hemorrhage of the lung in pulmonary disease, in which condition a secondary infection of a tuberculous nodule causes suppuration of the node with ulceration of a vessel wall. Lesions of the retinal vessels have been reported by several observers and a primary retinal disease set forth as opposed to the usual location in the choroid.

Cattaneo offers three groups of tuberculous lesions of the choroid: (1) miliary tuberculosis, (2) conglomerate tuercle, and (3) disseminated choroiditis. The first, he asserts, is a local process caused by the actual presence of the bacillus in an individual who has lost his resistance to the germ. The conglomerate tubercle is also a manifestation of bacillary activity but in an individual who has acquired an immunity of greater or less degree in the process of recovery from an infection elsewhere in the body some previous time. The prognosis in such cases is much more favorable. The third type, disseminated choroiditis, is considered a toxin effect acting in an individual with good resistance and with a more or less latent lesion elsewhere. The prognosis in such cases is good. A fourth form must be added to include the various types of vascular tuberculosis which seem in some cases to be embolic and in other cases thrombotic. The special form of disease of the retinal veins so well described by Harms as periphlebitis must also be kept in mind. These forms of vascular tuberculosis are especially common in younger persons with lowered vitality, and proliferating masses are apt to form, obscuring all fundus details. A number of small vascular lesions in young people in good health have been seen progressing to recovery without treatment of any kind.

We will omit from further consideration all discussion of miliary lesions, except to say that in nearly all cases of tuberculous meningitis in small chil-

dren these minute lesions of the choroid can be found with the ophthalmoscope and at autopsy. The conglomerate lesion is rather often seen and usually in young persons. It appears first as a large fluffy white spot in the fundus, more or less raised, with the retinal vessels running over it. The patient complains of blurred vision which is due in most cases to the vitreous changes which appear early in the disease. There is a large absolute negative scotoma in the corresponding area on the field map and this is larger by far than the apparent size of the lesion would justify. The favorite area for these lesions is behind the upper or lower vascular arch and anywhere from the disc, forward toward the ciliary body as far as the ophthalmoscope will reach and beyond. Whether similar lesions further forward, within or upon the ciliary body, cause the troublesome cases of uveitis and iridocyclitis is a question.

If the case is uninfluenced by treatment, the vitreous exudates expand in area, increase in density and form long translucent strings reaching well forward in the vitreous to make a typical proliferating retinitis with blood vessels running along the organized projecting masses. The iris may or may not take some part in the process with resulting synechiæ. In some cases the pupil is small and filled with exudate, the iris being firmly bound down. In such an eye, fundus changes cannot be detected, and not infrequently, cases present themselves in just this condition with a soft, blind eye.

If the iris changes permit, lens changes can be seen after a time. They begin with delicate opacities beneath the capsule, grouped about the posterior pole, with more or less fluorescence when the slit-lamp is used. This soon passes on to the opacity resembling "mashed potatoes", by which time more anterior parts of the lens are involved. At some time during the disease whether the iris shows involvement in the process or not, nodules of the type so well described by Koeppe will be seen on the iris edge. A few cases of conglomerate tubercle of the choroid under my observation have pursued a typical course without any of these nodules ever having been found, but it is my belief that they are present at some time or other.

If the lesion is located near the macula, this may participate in the picture as shown in the "star figure" of the case of Mr. K. In other cases, the optic disc turns quite white and leads us to think the optic nerve is involved. Pathological examinations showing actual invasion of the nerve sheath have been recorded. If the lesion is anywhere near the disc this will appear hazy and white, but this appearance may be caused by the vitreous exudates. A glance at the fundus illustrations found with this article will show this feature.

Recovery of vision in these cases depends upon the relation of the lesion to the macula and upon the length of time the lesion exists before it is controlled. If the lesion is remote from the fovea, the vitreous changes will not obscure the fovea but some of these changes remain even if the case is brought under control.

If a long time passes between the outbreak and its control vision does not return; the cause of this may not be explained by the appearance of the nerve head or by the presence of vitreous opacities. Many of the patients with one eye blinded by an intraocular disease that prevents examination with the ophthalmoscope because of cataract or vitreous clouding, belong in this group of neglected cases of conglomerate choroidal tubercle (or uveitis).

The x-ray is the most efficient agent that has come to my attention in controlling this type of tuberculous disease. Three or four exposures with the eye shielded by an aluminum or silver screen to exclude the rays that burn, and with a thirty percent to forty percent skin erythema dosage, have done wonders for several cases. The first effect is upon the vitreous exudates, which begin to clear after a single dose. The intervals between the rayings have averaged a week. In a few older cases,

with lesions well forward, a decided tendency to increase of tension has also been relieved at the same time. In these older cases, inunctions of the Ektebin ointment made by Merck of Darmstadt have seemed to be of great value. This is a tuberculin ointment prepared for rubbing into the skin. The local skin reaction may be very pronounced, the inunction area sometimes showing a large number of acnelike nodules. Tuberculin injections have not been used in this type of case, my conservative attitude being the result of unpleasant experiences with injections of tuberculin.

Of the various tuberculous eye lesions, it seems that this conglomerate lesion of the choroid yields to treatment more readily and leaves less damaged vision behind than any other form of intraocular tuberculosis.

The type of eye lesion simulating disseminated choroiditis is seemingly but a variation of this conglomerate lesion. Figure 1 (in the text) shows an extensive area involved during the course of seven years. The last lesion is but four months old and comprises the lower part of the defect. The original lesion was at the extreme top. Between the first and last outbreaks there have been two others, each located a bit lower than its predecessor and bordering upon it. This particular patient has learned that the relapses occur when he has been burdened by responsibility and confined within doors by his business beyond the regular hours. This is always the story of tuberculous eye disease, and rarely is a case seen of either of the two types now under discussion but what some lesser lesion has previously existed, sometimes without the patient's knowledge. Connected with or near the fresh lesion, will be found an old pigmented patch with the sclera shining between the pigment.

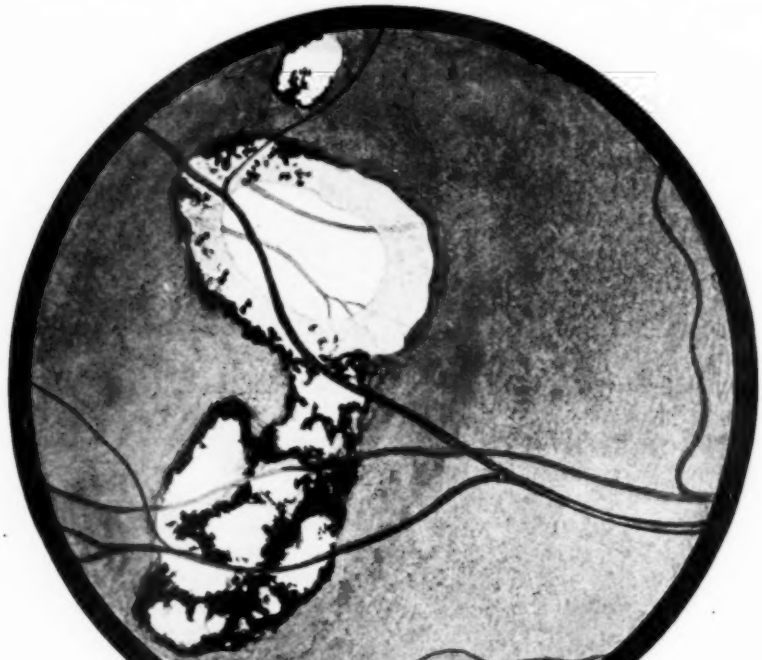


Fig. 1 (Lloyd). Choroidal tuberculosis resembling disseminated choroiditis. Five relapses in eight years.

Patients suffering with any form of eye tuberculosis will usually show associated physical signs and weaknesses. This has been discussed in the preamble, but the need for a general survey of the patient cannot be emphasized sufficiently. This patient is underweight and tires easily; his hair is white at the age of thirty and he is six feet three inches in height. The Wassermann test is negative. (It may be assumed in all cases here discussed that the Wassermann test has been made and found negative unless otherwise specified.) It will be at once apparent that, while this single large lesion resembles a lesion of disseminated choroiditis, there is no further similarity to that condition, the characteristic "dissemination" being absent.

Disseminated choroiditis always awakens a suspicion of specific origin, either inherited or acquired, but the Wassermann test is usually negative in these cases also. Although the individual lesions of the multiple type of tuberculous choroiditis may resemble those of typical disseminated choroiditis, they are relatively few in number compared with the classical case of disseminated choroiditis, in which the lesions may be scattered all over the fundus. The effect upon the vision is likewise quite different in the two diseases; the latter disease may show but little change in visual acuity despite lesions located even in and near the macula, but the tuberculous case has an absolute negative defect in the field chart corresponding with the location of the lesion.

The lesions of the conglomerate type progress steadily to a stage of very poor or no vision unless controlled, but the disseminated lesion may run for several years with little or no iritis to attract attention. During this period fresh deposits are to be seen upon the posterior surface of the cornea with the slit-lamp, while the older fibrin bits gradually acquire a brownish tinge or disappear. Round clumps of fibrin also form, and these are a step toward the "mutton fat" deposits often plainly seen with the naked eye by oblique illumination. Now and then, fresh nodules appear upon the iris edge, and during all this time the outward appearance of the eye is all that could be desired. After this condition has gone on for some time, fine vitreous opacities very like the "dustlike opacities" that have always been considered pathognomonic of syphilitic chorioretinitis, may form. The posterior polar region of the lens beneath the capsule eventually shows a clouding that slowly goes on to fully developed cataract.

At some time in the process there are usually acute signs such as circumciliary redness, pain, photophobia, and lowered visual acuity caused by vitreous opacities, but these usually subside, and, unless the examiner is most careful or uses the slit-lamp routinely, he will consider the case cured and dismiss it. Some years later this case will return with a well developed cataract unless the other eye is already blind, in which case the later gradual reduction in vision will attract the patient's attention sooner. Other cases of this same type will have intervals of complete rest with absolutely no sign of any kind, including negative slit-lamp findings, but from time to time outbreaks occur associated with enlargement of the original focus.

Cases of intraocular hemorrhage in young persons without other etiological suspicions are not so frequent in my experience as the conglomerate lesions, nor nearly so frequent as the cases of anterior types like iridocyclitis or uveitis. Clinical experience and the extended observations of well-known observers, as well as the experiments of Finnoff and Cattaneo, show the wisdom of considering every intraocular hemorrhage as a tuberculous lesion of a vessel unless other cause can be found. A survey of the patient may furnish proof of pulmonary lesions. If the patient is young the prognosis may be good when there is only a small defect in the field of vision, even if the tissues have been badly damaged. If the hemorrhage is premacular the results are more serious, but the final status of several retinal hemorrhages in young people

under my care has been very satisfactory.

The most common and also more serious tuberculous lesions of the anterior segment of the eye are those appearing as iritis, iridocyclitis, or uveitis. They may or may not accompany either of the two types of fundus lesion previously mentioned; more often one is in doubt on this point because the fundus examination cannot be made due to adhesions, smearing of the lens in the pupillary area, or lens changes. The prognosis is less favorable in older patients and in colored persons.

A typical case (number four) that might properly be labelled iritis will be found among the case reports. The subacute symptoms recurred, relief followed, and at the end of the trouble, vision was 20/20 and 20/20—3. There are now (seven years later) several adhesions in the left eye but none in the right. Toward the close of the case, a white spot was found in the left macular area and the illustration shows this lesion as it is now (October, 1929), and to this defect the trifling visual loss is attributed. There were vitreous opacities in this eye originally, and the pigmented spot now seen is another proof that despite the apparent predominance of the symptoms in the anterior segment of the eye there was also at least one choroidal lesion. Whether others were also present further forward than one could see is a question, but, even when the iritic and cyclitic symptoms are as prominent as in this case, fundus lesions should always be suspected.

It is not at all improbable that the ciliary body is the first part affected, from which point the disease spreads forward and backward. This case was under observation in the preslit-lamp days, but we believe that this now indispensable device would have shown characteristic deposits of bits and clumps of fibrin upon the posterior surface of the cornea, and that the adhesions which developed even when the pupil was dilated ad maximum came from iris nodules on the posterior aspect of the pupillary margin. Vogt has shown that these nodules do not contain tubercle bacilli, while Derby and his associates have been able to produce them in animals by injecting various kinds of dead bacteria. For this reason, they cannot be considered as positively pathognomonic, but so rarely do they occur in any other type that it is the responsibility of the observer to prove that they are not tuberculous rather than the reverse.

These nodules on the iris edge may be found there during the course of fundus lesions quite as well as in anterior eye lesions and the absence of all signs of iridic inflammation is no reason why they should not be looked for. In white people I have never seen them except upon the iris edge, but in the eyes of several colored persons they have been thickly scattered upon the iris surface and sometimes blended to form a waxy mass between the iris and the cornea or between the lens and the iris. In the latter instance, the iris was pushed forward in contact with the cornea, and in the former the mass filled the entire lower third of the anterior chamber. There was later a perforation in this case, lowering the tension to minus three, but all of this without pain or discomfort, other than slight lacrimation and photophobia. This is the great characteristic of tuberculous disease of the anterior segment in contrast with the syphilitic case, which is never so painless or so limited in its area or its effects. Many cases of tuberculous iridocyclitis never develop an acute stage but run on for years with but little limbal injection and this only at times. Nevertheless, new adhesions form at every flare-up, secluding and occluding the pupil.

There is one well recognized type of tuberculous uveitis that runs its quiet course of years without the slightest redness, pain, or deposits upon the posterior corneal surface recognizable by the naked eye. The slit-lamp will show fine bits of fibrin with an occasional clump here and there. After this has gone on for several years, the lens begins to cloud about the posterior pole beneath the capsule and eventually

a ripe cataract forms; after this the iris begins to lose its proper pigment in and upon the anterior layer, producing very gradually a strange contrast with the normal eye. This is the history of the usual case of true heterochromia. A variation of this form is brought to notice by complaints of poor vision at night, and, later in the case, by clouding of the vision by slowly developing cataract.

Such a patient is Mrs. S., who has a history of repeated lying up for general debility with heavy colds. After a period of rest, she recuperates and resumes work. At the age of twenty-seven years, her vision at night is very poor. Fine vitreous opacities are seen but no lesion in the fundus can be connected therewith. Fine fibrin deposits were seen upon the posterior surface of the cornea and soon the lenses showed the inevitable effects of the quiet uveitis. When her vision was lowered below the point of practical use, the necessary release from work permitted her removal to the country, where she immediately improved in every way except the cataracts, which were later operated upon with success. If but one eye had been involved, this would undoubtedly gone to heterochromia, but, as it turned out, it must be called chronic uveitis.

Between the two extremes of the sharp and severe onset and the quiet chronic uveitis, every possibe type can be found. The prognosis of these cases depends upon the resistance of the individual, which means as a rule, that youth offers much but older persons are not so fortunate. There are however, many younger persons who have been blinded first in one eye and then in the other because they were in poor health and unable to resist the disease. Not a few of this type die of tuberculous disease elsewhere in the body.

One patient of this type has vision of 10/70 in the left eye. This eye has been poor as long as he can remember. There is nothing to be seen in the front of the eye, but in the macular area is a large pigmented scar which suggests several choroidal lesions. The second eye was normal in every respect until this young man reached the age of seventeen years, when a low-grade cyclitis with sharp exacerbations, of two years standing, reduced the vision to light perception. The immediate cause of the poor vision is seclusion and occlusion of the pupil, with cataract.

In older persons, subacute iritis may begin after a period of poor health for which no good reason can be found. Vague joint pains and stiffness are often taken to be rheumatic, with removal of tonsils and other foci of infection. Sooner or later, the eyes attract attention and the patient is often incapacitated by poor vision following low grade iritis. The process is not limited to the front of the eye, as the vitreous opacities will show. Careful physical examination often reveals an active lesion in the lung or elsewhere, and after a year or two the patient dies of tuberculosis in the thoracic or abdominal cavity.

These cases are the most difficult to treat and the results are the poorest. In the acute stages, the x-ray does good work, but nothing seems to control the low grade uveitis that runs on indefinitely. Everything within our power should be done to build up the resistance of the patient, for if he is treated as an eye case there is little hope. As has been mentioned previously, colored people suffer severely with this type, and perforation from the anterior chamber by way of the canal of Schlemm to the surface in the limbal region may take place. The usual outcome of the average case is a quiet eye without vision, with the iris, lens and pupil smeared with organized exudate and shutting out any view of the interior of the eye. If perforation occurs, a shrivelled eye is the result. Not much different is the final state of an eye with severe involvement of the iris, ciliary body and lens. If there is a mass of waxy exudate in the anterior chamber pressing against the cornea or pressing the iris against the cornea, the cornea loses its transparency and all details beneath this opacity are lost. If there is much deposit on the posterior corneal surface low down, as is often the case, new

vessels form in the deep layers and vitreous membranes and in addition vessels may form in the chamber against the posterior corneal surface. Examples of these details may be seen in the illustrations accompanying this article.

An occasional precipitating factor in tuberculous disease of the anterior segment of the eye is trauma. One of the cases cited was the sequel of a blow upon the affected eye. Another type of lesion belonging to the tuberculous group and found on the cornea, on the limbus, or even upon the sclera, is the phlyctenule, formerly common but not seen nowadays with anything like the former frequency.

The bacillus of tuberculosis has never been found in the lesions of phlyctenular keratitis or conjunctivitis, and the characteristic nodule has been transplanted to the anterior chamber of rabbits with negative results. Typical phlyctenules have been produced in rabbit eyes after infecting the animal with the disease or sensitizing it with tuberculin, and then instilling the toxin of staphyloccoccus pyogenes aureus into the conjunctival sac. Healthy animals do not respond to this instillation, but the instillation in the sensitized animal is often accompanied by a severe conjunctivitis which is very like the conjunctivitis seen in scrofulous patients. Rubert and Rosenhauch have carried on these experiments with similar results.

Phlyctenular conjunctivitis does not often accompany severe tuberculous disease, but rather the milder types with lesions of the cervical, axillary, or bronchial nodes. It usually occurs in children, but some of the severest examples have been observed in adults, in which case the need of a thorough physical examination is apparent. Every now and then, in both children and adults, an attack of phlyctenular disease has been the precursor of basilar meningitis or pulmonary disease. Its rarity in adults and its frequency in children suggest that most of the former have recovered from some form of tuberculosis, thus acquiring an immunity. Occurrence in the adult might indicate the loss of this immunity.

Phlyctenular keratitis and conjunctivitis occurs most often as a single lesion or a group of fine blisters upon or near the limbus. The top of the blister exfoliates, whereupon a secondary infection with staphylococci is probable unless efforts are made to prevent it. In some cases, the secondary infection may be so severe that the case appears like a purulent ophthalmia. The lids are swollen shut, and the cornea cannot be seen without using a Desmarres lid retractor. After the secondary infection has been eliminated, the diagnostic signs of the real disease may be recognized. The severe type appears as if many fine grains of sand had been scattered all over the cornea. The irritation is intense. These lesions are much smaller than the first type and what happens to them can only be surmised, as they are too minute to study.

In small children suffering with phlyctenules, it is amazing to see how regular and intense is the reaction of the Pirquet test and how long evidences of the reaction remain when once established.

There are many who prefer tuberculin injections for the treatment of this condition, but in recent years the favorable response from other means seems to make this injection unnecessary. In this age of therapeutic nihilism one feels rather timid about suggesting the efficacy of a remedy given by mouth but the most satisfactory results following the administration of small doses of quinine in inveterate cases in youthful persons are worth noting. Several instances of young people under twenty, who have had red, watery and painful eyes for months, come to mind. Treatment of the nose had been without avail and everything a group of men could think of had failed to relieve the redness and lacrimation and control recurrences of crops of small blisters. The effect of the administration of quinine in some form and in very moderate doses has been most satisfactory. The dose and the preparation has varied but the effect

has been the same. It is fashionable to reject everything not shown in a test tube, but the repetition of a favorable result ought to be worth something, even in a pessimistic age.

Microscopic examination of the secretion of severe cases should always be made, as the secondary infection in some very acute cases has been found to be pneumococcic, yielding to optochin or mercurochrome. After the secondary infection is removed, the case assumes quite a different aspect. It should be a routine measure in these cases to instil a local antiseptic such as argyrol as soon as the eye is the least red; the drops used will not cure the case but will eliminate the photophobia, lacrimation, and eczematous condition of the lids and lid angles. After efflorescence of the blisters there should soon be but little reaction or redness, but if this is present it indicates a secondary infection.

Some years ago, it was not at all unusual to see cases of phlyctenular conjunctivitis with intense photophobia for months with eyes but little injected. Occasionally a new crop of blisters would form and this would be announced by intense redness and lacrimation, causing the child to bury its head in a pillow or to seek some dark corner where it would lie inert for hours at a time. Such cases are now a rarity and this has been brought about probably by better housing, better food, and more light and air. Probably two important factors overlooked in the search for the influence that has lowered the tuberculosis morbidity and mortality to the amazing degree shown by reliable vital statistics everywhere in this country, have been the education of mothers in infant feeding and the general use of pasteurized milk.

A decidedly unusual but most important entity in which the eye lesions are an important feature is seen in the group of cases diagnosed as polyarthritis deformans. Not all of these cases have eye symptoms, but the type to which I refer begins as a slow, chronic joint disease which cripples the patient and ties him up in bed. After a few months, he is helpless because of stiff and ankylosed joints including the small finger joints. Nothing seems to stay the progress of the disease and finally, to add to the misery of the pitiable state to which the patient has come, a low grade iridocyclitis appears. There is moderate circumciliary injection with moderate photophobia and lacrimation; adhesions form from time to time despite maximum dilatation so that the already adherent and irregular pupil is soon occluded and secluded. There are remissions and exacerbations which nothing controls. The cornea participates to an extent and soon becomes clouded from the periphery with more or less vascularity, until it is difficult to see the iris. Both eyes are usually affected and the patient is soon blind. Some of these cases are surely tuberculous and may be classed among the so-called "tuberculous rheumatisms." The venereal factors and the unidentified infections are recognized generally, but the tuberculous type and especially tuberculous iridocyclitis are often missed.

Illustrations of various types of tuberculous lesion with brief case recitals will be offered to make plain the clinical aspects of a group of cases that demand our most serious consideration.

When Helmholtz gave the profession the ophthalmoscope, a new world was opened to the eyes of the oculist, and every conscientious worker desiring to discharge his obligations to his patients according to the best standard of the moment was obliged to add this instrument to his equipment and learn its possibilities. Previous ideas of diagnosis were scrapped, disease groups realigned, and conditions previously hopeless or in the doubtful list were reviewed in a new light.

The slit-lamp has done much the same thing for the oculist of this day, and this instrument is now as essential as the ophthalmoscope was then and still is. Many keen observers claim they can detect the minute deposits upon the posterior corneal surface that lead to a correct diagnosis of the difficult case without this instrument.

Nevertheless, I have yet to see a man who has acquired a slit-lamp and used it, but who has failed to grasp its possibilities and would part with it. One of the most striking accomplishments of this instrument is the separation of tuberculous types, from the iritis group narrowing down idiopathic iritis cases to a minimum.

Irrespective of what the cause may be, a most discriminating search of the patient is in order in these chronic eye diseases, because no one factor contributes so much to the patient's future as increased resistance. Genuine sources of infection should receive attention, but with discrimination. Merely because a patient has a low grade iritis or a chorioretinal lesion with vitreous haze, there is no sense in ordering tonsil or dental surgery lightly as is so often done. Still, with tuberculosis as a probable cause of these low-grade conditions in our minds, no less careful examination of the patient is required and no less judicious removal of diseased foci should be done.

A thorough examination of the chest by every means at our disposal, careful laboratory work, and a broader view will remove many cases from the group of unsatisfactory results. Many cases previously discharged as cured (to return later, with cataract or heterochromia, occluded and secluded pupils, or retinitis proliferans) will be continued under observation not for one or two months but for years, or as long as fibrin deposits upon the posterior surface of the cornea or iris nodules on the pupillary margin indicate the continuance of a process not detectable by the means at our disposal before the slit-lamp came into use. Tuberculosis of the eye is but a part of a serious general condition, and is more common than is generally thought. Its outstanding characteristic is chronicity and a tendency to relapse. Many of these patients die of tuberculous lesions elsewhere after the eye condition has given the hint that the original focus of the disease is again active.

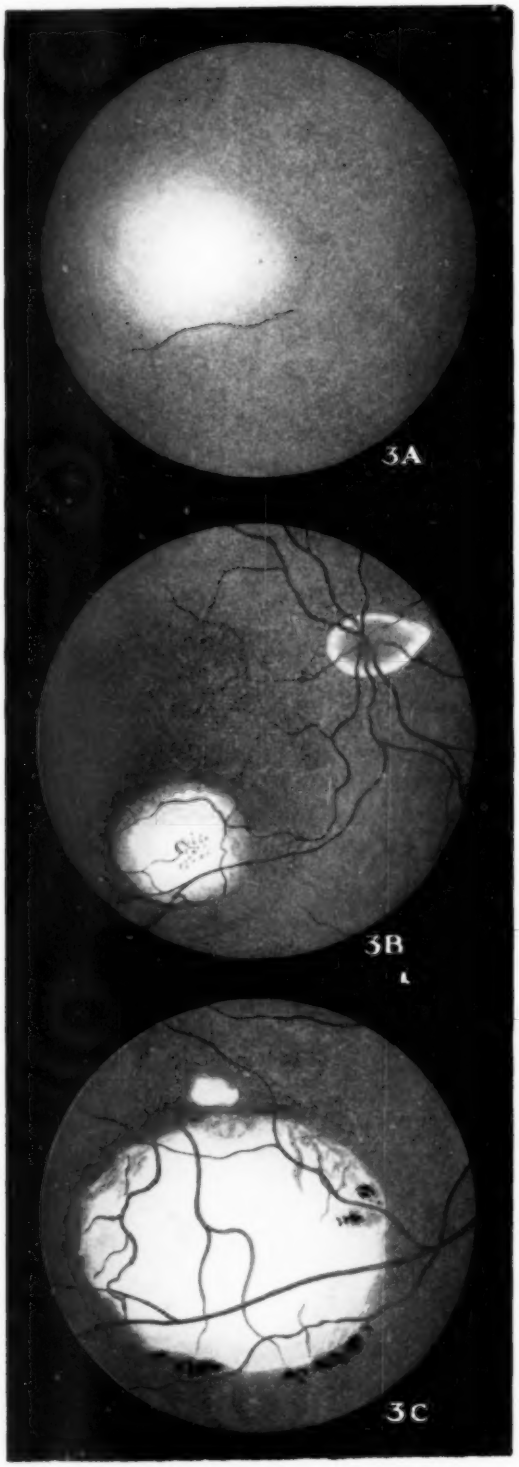
Sclerosing keratitis is an extremely rare type of tuberculous disease of the ciliary region featured by opacity of the corneal margin in the region of the diseased focus. Owing to the length of this article, it seems wiser to discuss only the usual types of tuberculous disease of the eye.

Three cases of large choroidal tuberculoma under observation for at least two years, with water color drawings of the fundus at various times, showing the amazing effect of a few x-ray treatments, will be offered first. In one of these cases no iris nodules were ever found, but in the other two they were present.

Case one. Mr. K., aged fifty-one years, was a heavy and apparently healthy man who had had a similar attack twelve years ago. His vision of 20/20 and 10/200 is explained by the condition of his left fundus, of which a painting is shown as of April 22, 1928, (frontispiece 1A) fifteen days after he came under observation. The posterior corneal surface was dotted with bits of fibrin and there were dust-like vitreous opacities, but not until two weeks later did the iris nodules appear.

One week after he first appeared, the star figure in the macular area developed and he was sent to Dr. W. H. Dieffenbach of Manhattan for x-ray treatment. The effect was prompt, for after three treatments at one week intervals his vision returned to 20/30 in three months. The first effect of the x-ray was upon the vitreous opacities, which at once began to clear. The progress toward better vision was continued, and the second painting was made in October, 1928.

With the clearing of the vitreous opacities, there came to view an old spot near the larger and newer focus, and we elicited the history that he had a previous experience much like this one, twelve years before, and despite the negative Wassermann reaction at that time had been treated with blue ointment. This may suggest to some that here was really a specific case, but if this is so a very efficacious treatment for syphilis has been found in the x-ray. No lesions were found in his chest or



TUBERCULOSIS OF THE EYE (RALPH I. LLOYD). CASE 3. (SEE PAGE 765.)

elsewhere, but the history of previous lesion and relapse is according to our experience. The third painting (frontispiece 1C), was made November 16, 1929, and shows the complete clearing with the inevitable scar and an absolute scotoma corresponding thereto in the visual field. The vision at that time was 20/33. The older lesion is seen at the lower part of the larger lesion in (frontispiece 1B).

Case two: Mr. L. At the age of twenty-one years, the vision of the left eye was blurred so that he could only count fingers at one foot. He has been treated for syphilis despite negative Wassermann test. He has a mild scoliosis, is overweight, and his complexion is pasty. In addition to the lesion shown, there are many fine vitreous opacities, and vitreous strands can be seen reaching forward almost to the lens. There are nodules on the iris edge, and deposits in plenty upon the corneal posterior surface.

The patient has pyorrhea, which is rather unusual in so young a person, but we regard this as an effect of the basic condition rather than a cause of the eye condition. The Pirquet test developed slowly but was very pronounced and lasting. Three months passed between his original complaint and the time when I took charge of the case and recommended the use of the x-ray. Three treatments were given by Dr. W. H. Dieffenbach at intervals of one week, and improvement in the vitreous exudates was seen at once. The vision however, never did improve, but the disc was very white, leading to the conclusion that this was an amblyopic eye or that the nerve was involved with subsequent atrophy as has been seen in cases brought to autopsy.

In four months, all finer opacities had cleared, but there are still (18 months later) the vitreous strands reaching forward. Shown in frontispiece, 2A dates from April, 1928; figure 2B from November, 1928; and figure 2C from November, 1929. When last seen, the corneal deposits had disappeared, there was more or less pigmented débris on the anterior surface of the lens, and there were no synechiæ, but beads on the vitreous strands were numerous.

Case three (plate 6, figures 3A, B, and C): Mr. Kn., twenty-nine years of age, is of a delicate precocious type, with a history of indefinite periods of poor health making him weak and listless. The lungs have been under suspicion, but nothing definite found there. Suddenly, one week ago, the left eye became blurred; he could read 10/200. The drawing, made three weeks later, shows the large mass obscured by vitreous exudates of fine dustlike character. In addition, blood could be seen by using a strong beam of light directly through the large pupil, with the observing eye looking along the beam. There were multitudes of fine floating dots in the aqueous and bits of fibrin sprinkled all over the cornea, but no nodules were ever found on the pupil margin.

Dr. Rendich gave three x-ray treatments, and in three months the vision returned to 20/33 less three letters. Progress has been uneventful so far as the eye goes, but the patient is subject to vague illnesses without definite lung findings. The vitreous opacities of the finer type have all disappeared, but some of the larger vitreous strands remain. As in all of these cases, the first sign of improvement after the first x-ray treatment was clearing of the finer vitreous dust and blood. This case was placed under treatment sooner than the rest, because the other cases had given confidence in the merits of the x-ray, and placed it among the first treatments to be used instead of at the foot of the list. In this case also there were positive signs of a previous lesion, and in all probability others will follow unless the patient's general health is much improved.

Case four shows the difficulties of correct diagnosis in cases coming late, after the pupil is clogged or adherent. One is unable to tell whether only the anterior segment is concerned, and development of tension is not so uncommon when the lesion is far forward. If

favorable developments permit a view into the eye later on, after the original diagnosis of uveitis has been made, large conglomerate masses may be found, which with the history will clear the diagnosis. Mrs. S. has been under observation for more than six years, coming first because the vision of the right eye had suddenly blurred to the point where only large objects could be dimly seen. There is a semi-opaque elevation on the cornea, running crosswise below the pupil. Deposits on the cornea are seen, but a view into the eye is impossible. According to the Schiøtz instrument, the tension is 27.5 and 20 mm. respectively right and left.

Under the use of Burnham's soluble iodine internally and pilocarpin locally, the tension came down and the welt on the cornea disappeared in three months. Vision improved to 20/50 but vitreous opacities and the corneal deposits were still evident. One year later, there was an exacerbation, which brought the patient in for relief of pain and photophobia. Adhesions had formed and vision dropped to 10/40. The previous treatment was resumed, and after a month, a large white mass could be seen in the lower anterior fundus.

Four years later, another attack with plus tension occurred, but no new adhesions formed. This bothered her a great deal, and she was referred to Dr. Rendich for x-ray treatments, which promptly relieved the acute symptoms and also the plus tension. The corneal deposits continued steadily for a year but began then to acquire pigment, indicating age or recovery. In November, 1928, inunctions of Ektebin ointment were instituted at weekly intervals until they gradually ceased to evoke local reactions. At first, several hundred hard acnelike pimples were raised, but in four months the response gradually became less and less and finally the ointment was discontinued. The effect of these inunctions has been most favorable, and now the vision is 20/66, and details of the large choroidal scar can be seen easily through the pupil, where formerly only a large elevation was dimly seen.

It is my belief that if we could look into the eyes of cases of old, recurring iritis or iridocyclitis with one blind eye and a history of repeated low-grade ciliary injection, even with mild hypopyon that disappears as rapidly as it appeared, similar fundus lesions could be found. In this case, iris nodules were conspicuous by their absence, although the early examinations were without the benefit of the slit-lamp.

To contrast the prognosis in a young person with that of the average older patient, the following two cases are cited:

Case five: Miss Betty Z., at the age of fifteen years, had a sharp pain in the right eye with moderate limbal injection. Adhesions were present when she first came in. These were easily broken and the symptoms soon quieted, only to start anew, and soon again to be relieved. Shortly the left eye became involved, and several adhesions formed in it that could not be broken, as the pupil was dilated ad maximum. The vitreous of both eyes was full of fine dustlike opacities, but the Wassermann test was negative. The family physician was not able to find active lung lesions and the patient's health seemed perfect. Toward the last of this illness, a small white spot could be seen in the left macular area, accounting for the lower vision in this eye at that time,

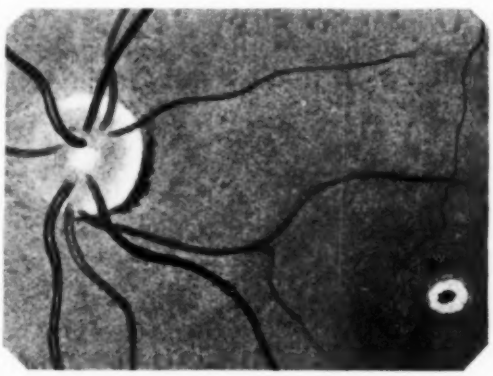


Fig. 2 (Lloyd). Same patient as number three. Fundus lesion eight years after tuberculous iridocyclitis.

20/30 as compared with 20/20 for the right eye.

After some sixteen months, the symptoms disappeared. The illustrations made eight years later show nothing of her original illness except a small black spot in the left macular area (figure 2 in text), and a vitreous membrane springing from the angle of the chamber below and running upward on the posterior surface of the cornea to end in small suckerlike processes (figure 3 in text). We believe this was a blood channel developed as a protection against the evil effects of cyclitic deposits, something often found in cases with long standing and recurrent deposits upon the lower part of the cornea.

Fig. 3 (Lloyd). Formation developed on posterior surface of cornea during tuberculous iridocyclitis eight years before.

The choroidal lesion impresses upon us the importance of watching the fundus when we can, because in cases with a diagnosis of iritis or iridocyclitis the disease is rarely limited to the anterior segment of the eye. This patient now has a visual acuity of 20/20 O.D., and 20/20 less a letter or two, O.S.

Case six: In contrast with this very happy outcome is the case of Miss Sr, aged seventy-two years. After an automobile accident in which her leg was broken and her body and limbs badly bruised, the vision of the right eye blurred very suddenly and became red and moderately painful. The fundus was not open to inspection, because of profuse vitreous opacities. Typical iris nodules were present upon the posterior iris margin, also pigmented deposits upon the anterior surface of the lens in the pupillary area, and nonpigmented fibrin on the cornea. The adhesions were easily broken and all acute symptoms soon relieved, but there was no improvement in vision, nor has there been in the year following. (Figure 4

Fig. 4 (Lloyd). The white spots on the anterior surface of the iris are atrophic areas. On the left side, the iris margin shows four typical "nodules". On the right side, just above the center of the iris margin, is an adhesion that originated in a similar nodule. The anterior surface of the lens is spotted with pigmentary deposit which, despite the patient's statement to the contrary, indicates a long standing condition. The lens is gradually becoming cloudy.

in text.) The illustration shows the eye at this time with the lens less transparent than usual because of senile changes. True to form, this case has had its up and downs, with adhesions forming gradually despite every effort, until at present the pupil is small and adherent generally. There has never been an elevation of tension, but nodules and corneal deposits have persisted despite the satisfactory appearance of the eye.

Recently, after a sharp aggravation, the anterior chamber was one-third filled with blood that cleared in a month, leaving the cornea much clouded and with many new vessel loops forming in the deeper layers. About one year after the initial lesions, the second eye was suddenly clouded and vision reduced to 10/70, where it remains. An adhesion or two have formed, and the characteristic post-corneal signs are easily found. The immediate cause of the poor vision in the left eye is vitreous exudate. While the symptoms that attract attention in these cases are anterior, it is hard to believe that the entire uvea was not involved from the beginning. X-ray treatments relieved the acute attacks in the right eye, but the chronic stage

continues despite any form of treatment we have used.

One or two other cases of this type in older persons recall the fact that there are two ages especially exposed to tuberculous eye disease; young people around twenty and older persons (especially women) of fifty or sixty years. The latter group not infrequently begin a long period of invalidism with this type of iridocyclitis, after which indefinite muscle and joint pains and swellings suggest the underlying cause to be rheumatic, for which removal of teeth and tonsils is done as a routine. The expected relief does not follow, and finally chronic pulmonary disease ends the scene.

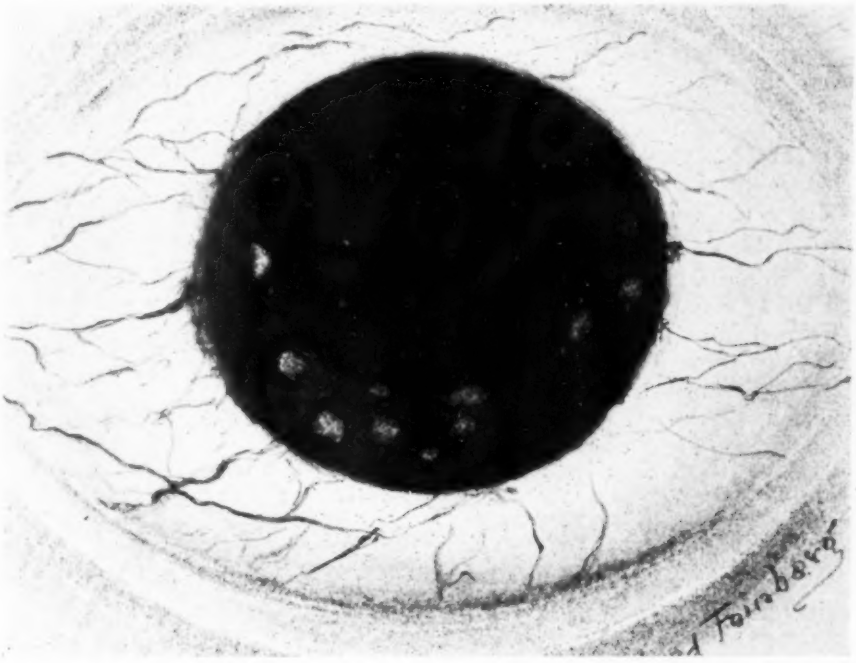


Fig. 5 (Lloyd). Attack followed blow on eye. Patient was a young colored woman who later developed pleurisy with effusion and died of tuberculous peritonitis.

Case seven: Colored persons have less resistance to tuberculosis of the eye, and most aggravated types are seen in them. The first illustration of this group is in the eye of a young colored woman of twenty years who was struck in the left eye by a basketball. The eye became watery and red, with vision somewhat reduced. After some days of this, she came to the clinic with the eye as it is seen in figure 5 in the text. Under atropin and general measures to improve her condition, this eye improved, while the second eye became involved, but to a lesser degree. She was irregular in her attendance, but after three or four months was in apparently good condition. She then developed a pleurisy with effusion which was relieved, and in another three or four months she entered a hospital because of peritoneal tuberculosis. She was operated upon without success and died about a month later.

Case eight: The second case of this group was in the left eye of a colored boy of eight years who was brought because of the redness of the left eye and poor vision. (Figure 6 in text.) There was no pain then nor did the condition ever bother him. A large waxy mass in the anterior chamber developed from numerous nodules on the anterior surface of the iris, and finally perforation took place just behind the limbus but without visible escape of

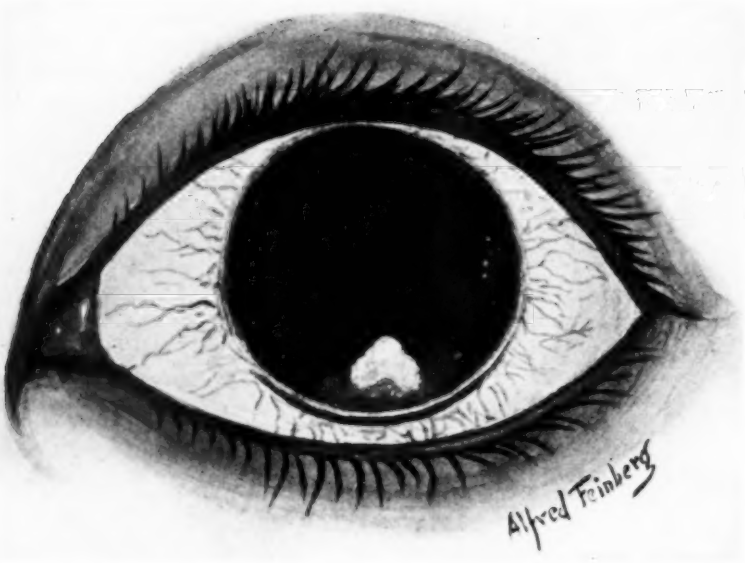


Fig. 6 (Lloyd). Colored boy of eight years. Perforation at limbus, and enucleation.

fluid. The tension dropped to minus three and the perforation occurred in spite of x-ray treatments. Seemingly, the process passed from the angle of the anterior chamber into the canal of Schlemm and thence to the surface. The eye was enucleated.

Case nine: The third case of this kind was in the right eye of a healthy-looking colored woman of twenty-three years. (Figure 7 in text.) This eye had been bothering her for some weeks, but she came finally because of the nagging pain. This was promptly relieved by x-ray treatments. When she first appeared, there was a waxy mass behind and below the pupil, pushing the iris against the cornea, which soon

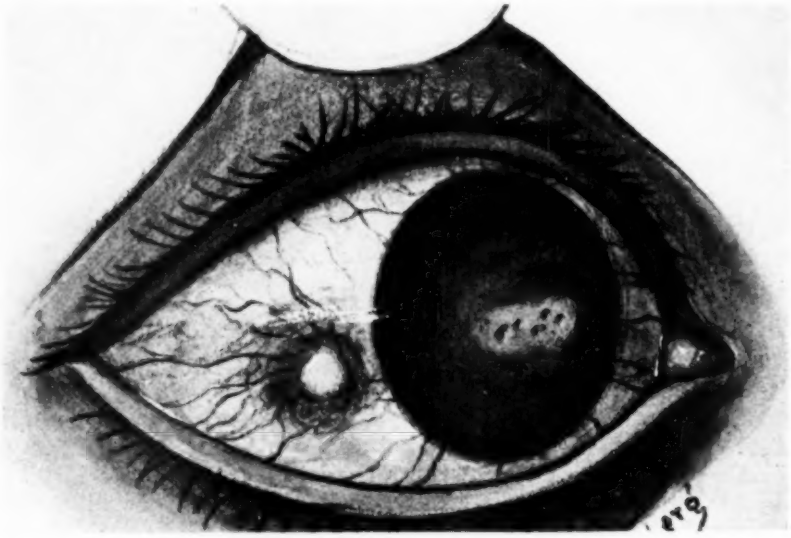


Fig. 7 (Lloyd). Colored woman. Scleral nodule. Vision nil. Neglected case. Relief from x-ray treatment.

clouded so that nothing could be seen through it below the pupillary center. The transverse corneal opacity in the upper corneal layers and on the surface came next, giving the appearance seen in the picture. This eye soon quieted, but the iris, lens, and remains of the exudation formed one mass connected with the posterior surface of the cornea. The nodule on the sclera disappeared very slowly and signs of it could be seen for three months thereafter.

Case ten: The slitlamp appearance of the eye of a young colored woman without the slightest redness, but with large nodules on the anterior iris surface, is shown in figure 8 in the text. The deposits scattered upon the posterior corneal surface are visible only to the slitlamp and cannot be studied with the loupe.

Case eleven: The next illustration is of the vascular type seen in a young boy of sixteen years with no other complaint than poor vision. (Figure 9 in the text.) With no special treatment but increased hours of rest and more outdoor life, he made an uneventful recovery. This sort of thing is not at all unusual in young persons with good resistance, but some of the most pitiable cases are those of young persons who are in bad health and make a poor fight against invasion of the eye tissues.

Fig. 8 (Lloyd). The many spots are deposits on the posterior surface of the cornea. These are hardly noticeable with a loupe but are of the type known as "mutton fat". Three large nodules on the anterior surface of the iris can be seen, and seem to be an exudate squeezed from the deeper parts of the iris through a small hole. On the right at the center of the iris margin is the typical iris nodule which is almost pathognomonic of tuberculosis. No white person with white nodules on the iris surface like this has ever been seen by the writer.

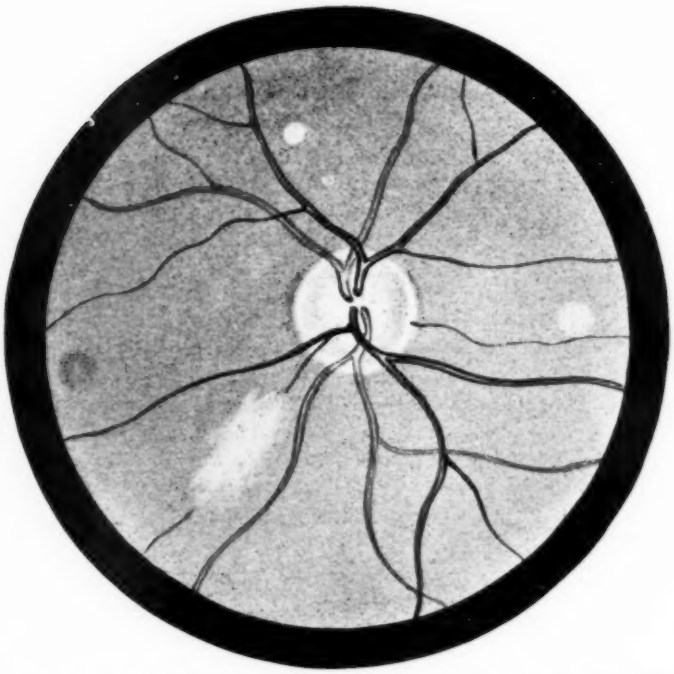


Fig. 9 (Lloyd). Youth of sixteen years. Vessel tuberculosis. Recovery without treatment.

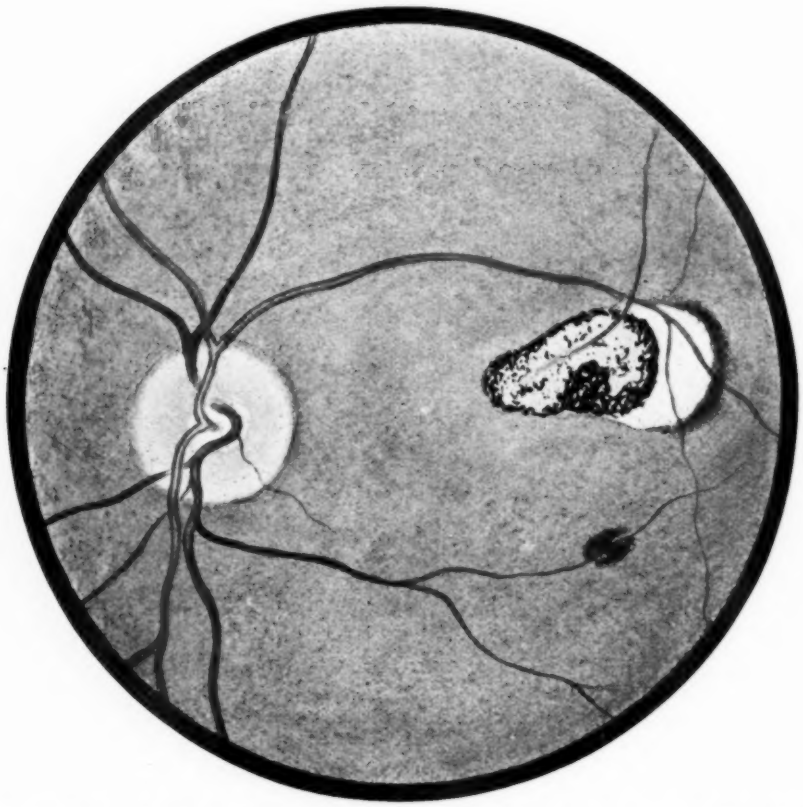


Fig. 10 (Lloyd). Lesion developed in childhood, reducing vision to 10/70. Second eye, involved at age of twenty, is blind.

David H. is now twenty-two years of age and in excellent health, but was in bad physical condition from ten years of age up to the last year or so. The family pocketbook has improved during this period, and he has obtained employment with a firm that does what it can for its employees; and to this humanitarian interest the patient is indebted for what little vision he now has. The illustration (figure 10 in text) shows the interior of the left eye, which has a visual acuity of 10/70. The other eye is a wreck from long continued iridocyclitis with an opaque and lime-infiltrated lens. The iris is generally adherent, but during the past two years, under tuberculin injections and x-ray treatments, the exacerbations have ceased and the deposits (figure 11 in text) upon the posterior corneal surface are pigmented and scanty, making us feel that this eye is now really quiet.

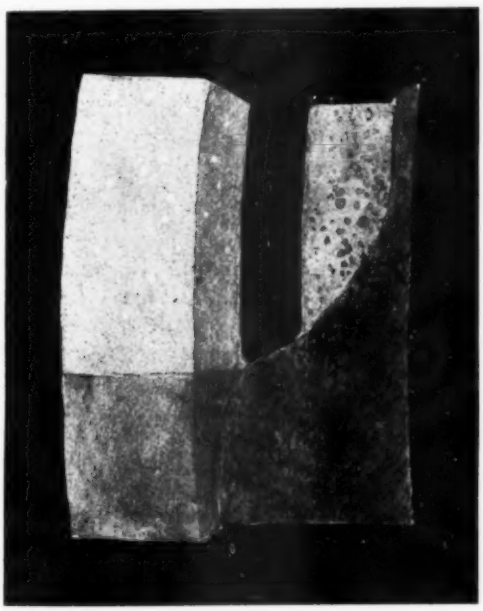


Fig. 11 (Lloyd). Composite slit-lamp image. The "block of ice" at the left shows a dark band at the bottom which is the iris out of focus. The posterior surface of the cornea has many small pigmented spots indicating that the deposit is old. The iris at the right is adherent to the lens surface which is spotted by pigmented deposit. The clear black zone separating the "block of ice" and the iris lens level is the optically empty anterior chamber.

The left eye, which had been considered useless since childhood is now his sole dependence.

Hemorrhages into the vitreous with a decided tendency to relapse carry the same varied prognosis as the anterior lesions. In young people with adequate resistance, the final vision is usually good and the permanent defect small. But in others, with lowered resistance and especially older people in bad health, relapses and a strong tendency to organization of the clot into retinitis proliferans often ruin the vision entirely.

Case twelve: The final case is that of a young woman of twenty-one years, weighing ninety pounds when she first came for treatment. The right eye (figure 12 in text) has had no central vision since childhood, because of a large macular defect of the disseminated choroiditis type, which is shown. The slit-lamp showed fine deposits upon the posterior corneal surface and a beginning secondary cataract at the posterior pole, beneath the capsule. She complained of sudden loss of vision of the left eye, which was occasioned by vitreous exudates of fine dustlike particles. Limbal injection was not excessive, nor was the pain bothersome. There was no trouble with adhesions, as atropin held the pupil wide without difficulty.

In the course of three months, the vitreous exudates cleared and two small choroidal lesions came into view, just above the macular area. The vision was 20/20—5, and the eyes cleared without apparent residual activity, but the slit-lamp showed characteristic deposits on the cornea which have remained visible for six years. At one time injections of tuberculin were tried, but the second dose of 1/1000 of a milligram, after 1/10,000 of a milligram had been given without effect, caused in both eyes a severe reaction lasting for six months. Nodules appeared upon the edge of the left iris, the deposits on both corneas increased, and several adhesions formed in the right eye. Both irides are now losing color, both lenses show posterior polar opacities, and a double heterochromia is developing.

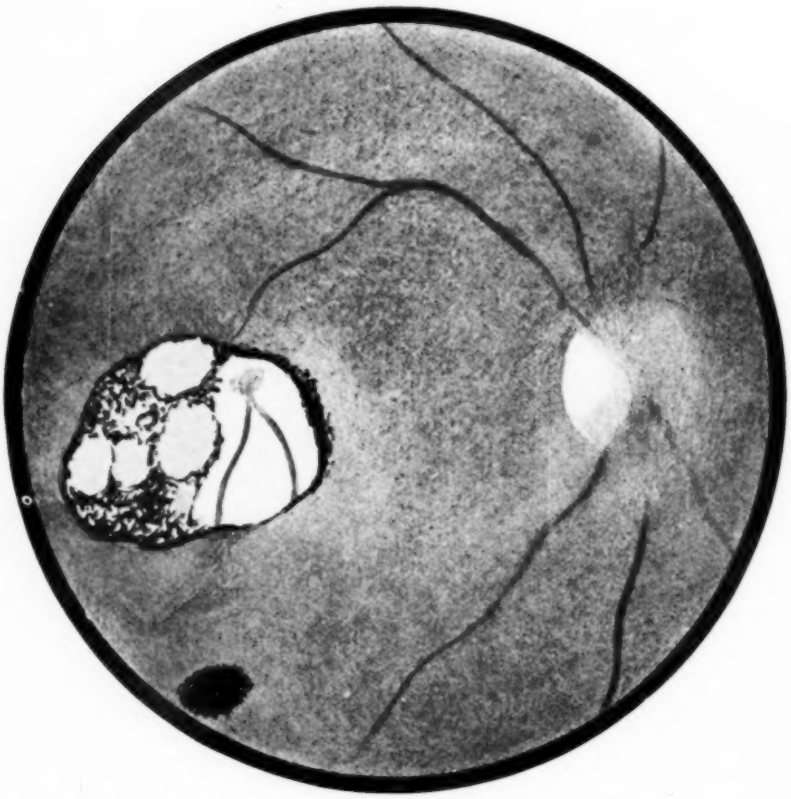


Fig. 12 (Lloyd). Mrs. W—D, aged twenty-nine years. Right eye blind for many years from lesion developed in childhood. Under observation seven years. Left eye involved twelve years after right.

In this article very little has been said about heterochromia, which in most cases is the result of chronic tuberculous uveitis. As the former condition is the subject of a separate article, the reader will be referred to that article. Not all readers will agree with me that tuberculous eye disease is relatively common, preferring the theory of focal infection as a better explanation. It is worth while noting that Lang found eleven percent of his iritis cases were tuberculous while Brown and Irons set their figures at eight per-cent. Rafaelson (Germany) found 2.5 per cent of 1850 consecutive eye cases to be of this type, while twenty-three per cent of 168 cases of iritis and iridocyclitis and thirty percent of twenty-five cases of choroiditis were diagnosed as tuberculous.

The finer diagnostic signs of cases of serious eye disease cannot be appreciated without the slit-lamp, and it is not too much to say that this instrument is now next in importance to the hand ophthalmoscope.

14 Eighth avenue.

Bibliography

1711. Maitre-Jan. Traité des maladies d'œil, p. 456. (Troyes.)
1811. Saunders. Treatise on some practical points relating to diseases of the eye, p. 119. (London.)
1820. Delarue. Cours complet des maladies des yeux, p. 206. (Paris.)
1829. Ammon. Litterarische Annalen der gesamten Heilkunde (Hecker's) v. 5, Sept.
1830. Prael. Beobachtungen über Aftergebilde im Auge. Jour. der Chirurgie und der Augenheilkunde, v. 14, p. 584.

1833. Lawrence. A treatise on disease of the eye, p. 593.
1834. Lincke. De fundo medullari oculi. (Leipzig.)
1852. Gerlach. 29te Versammlung deutscher Naturforscher und Aerzte. (Wiesbaden.)
1854. Mackenzie. Treatise on diseases of the eye, 4th edition, p. 705.
1855. Graefe. Preparat von Choroiditis tuberculosa bei einem Schweine. Arch. f. Ophth., v. 2, pt. 1, p. 210.
Jaeger. Ueber Choroidealtuberkulose. Oest. Zeit f. prakt. Heilkunde, no. 4.
1858. Manz. Tuberkulose der Chorioidea. Arch. f. Ophth., v. 4, pt. 2, p. 120.
1863. Manz. Tuberkulose der Chorioidea. Arch. f. Ophth., v. 9, pt. 3, p. 133.
1866. Busch. Zwei Fälle von Geschwulstbildung im Augenhintergrunde. Virchow's Archiv, v. 36, p. 448.
1867. Cohnheim. Ueber Tuberkulose der Choroidea. Virchow's Archiv., v. 39.
Graefe. Ueber Tuberkel in der Aderhaut. Klin. M. f. Augenh., v. 5, p. 299.
1868. Becker. Choroidal tubercles. Notisblad för Läkare och Farmaceuten. (Helsingfors.)
Bouchut. Des tubercles de la choroide et le retine, pouvant servir au diagnostic de la tuberculose cérébrale. Gaz. des. Hôp., 1868, no. 52; 1869, no. 1.
Cohnheim. Ueber Tuberkulose der Aderhaut. Berlin klin. Woch., v. 69.
Fraenkel. Die Tuberkulose der Choroidea und die Miliärtuberkulose des Kindes. Jahresb. f. Kinderheilk., v. 2.
1868. Graefe and Leber. Ueber Aderhauttuberkel. Arch. f. Ophth., v. 14, pt. 1, p. 183.
Wells. Tubercle of the choroid diagnosed by the opthalmoscope during life. Med. Times and Gazette, no. 914, Jan. 4.
1869. Jaeger. Hand Atlas, p. 214, plate 28, fig. 121.
1870. Gradenigo. Observation d'irite tuberculeuse. Ann. d'Ocul., v. 64, p. 177.
Steffen. Ueber Miliärtuberkulose und Tuberkulose der Chorioidea. Jahresb. f. Kinderheilk., v. 2.
1871. Jeaffreson. Tubercles of the choroid in a case of acute tuberculosis. Ophth. Hosp. Rep., v. 7, p. 186.
Wadsworth. Tubercle of the choroid in acute miliary tuberculosis. Boston. Med. and Surg. Jour., v. 84.
1872. Pasquer. Tubercules de la Choroide. Jour. d'Opht., v. 1, p. 560.
Sichel. Mémoire pratique sur la choroidite circonscrite. Ann. d'Ocul., v. 67, p. 129.
1873. Manfredi. Studio clinico istologico di un caso a contribuzione della tubercolosi oculare. Ann. di Ottal., v. 4, p. 265.
1875. Dubrisay. Tuberculose généralisée, tuberculose de la choroide. Gaz. des. Hôp. de Paris, v. 48.
1877. Weiss. Ueber Tuberkulose des Auges. Arch. f. Ophth., v. 23, pt. 4, p. 57.
1879. Deutschmann. Notiz über Impftuberkulose des Auges. Arch. f. Ophth., v. 25, pt. 4, p. 280.
Haab. Die Tuberkulose des Auges. Arch. f. Ophth., v. 25, pt. 4, p. 163.
Hänsel. Beiträge zur Lehre von Tuberkulose der Iris, Cornea, und Conjunctiva nach Impfversuchen an Thieren und klinischen Beobachtungen am Menschen. Arch. f. Ophth., v. 25, pt. 4, p. 1.
1880. Bruchner. Doppelseitige disseminierte Tuberkulose der Choroidea mit gleichzeitiger Papillär-retinitis. Arch. f. Ophth., v. 26, pt. 3, p. 164.
Deutschmann. Zur Impftuberkulose des Auges. Arch. f. Ophth., v. 26, pt. 2, p. 99.
1881. Costa-Pruneda. Ueber primäre menschliche Iristuberkulose mit nachfolgender Ueberimpfung auf das Kaninchen. Arch. f. Ophth., v. 32, pt. 3, p. 174.
Manz. Zwei Fälle von Tuberkulose des menschlichen Auges. Klin., M. f. Augenh., v. 19, p. 3.
Michel. Ueber Iris und Iritis. Arch. f. Ophth., v. 27, pt. 2, p. 171.
1882. Brailey. Case of tubercle of the eye, resembling in some of its clinical aspects a retinal glioma. Med. Times and Gaz., pt. 2, p. 512.
Falchi. Tuberculosi dell'occhio per inoculazione (ricerche sperimentali. Contribuzioni cliniche e anatomiche.) Ann. di Ottal., v. 11, p. 277.
Hosch. Un cas de tuberculose de la choroide inoculée dans le chambre antérieure des lapins. Arch. d'Opht., v. 2, p. 508.
Mules. Case of tubercle of the iris, choroid, and retina. Trans. Ophth. Soc. United Kingdom, v. 2, p. 265.
1883. Burnett. Large tubercular tumor of choroid. Arch. of Ophth., v. 12, p. 315.
Mackenzie. Case of chronic tubercle of the choroid and brain. Trans. Ophth. Soc. United Kingdom, v. 3, p. 119.
Money. On the frequent association of choroidal and meningeal tubercle. Lancet, pt. 2, p. 813.
1884. Haab. Weitere Mitteilungen über die Tuberkulose des Auges. Klin. M. f. Augenh., v. 22, pt. 3, p. 391.
Mules. Tubercle of the choroid. Trans. Ophth. Soc. United Kingdom, v. 4, p. 159.

Reissmann. Ein Fall von tuberkulöser Choroiditis mit spontaner Perforation der Sclera in das Subkonjunktivalgewebe. Arch. f. Ophth., v. 30, pt. 3, p. 251.
Schäfer. Chronische Tuberkulose des Auges. Klin. M. f. Augenh., v. 24, p. 307.
Warner. Tubercle of the choroid which led to the diagnosis of tubercular disease. Trans. Ophth. Soc. United Kingdom, v. 3, p. 136.
1885. Lawford. Tubercle of choroid, demonstration of the bacillus Koch in the tuberculous nodules. Trans. Ophth. Soc. United Kingdom, v. 6, p. 348.
1886. Neese. Ein Beitrag zur Tuberkulose des Auges. Arch. f. Augenh., v. 16, p. 267.
1887. McHardy. Localized tuberculosis of the choroid; enucleation and recovery. Trans. Ophth. Soc. United Kingdom, v. 8, p. 179.
1888. Davidson. Case of tubercle of the choroid seen during life. Med. Presse, v. 45, p. 610.
Lawford. Two cases of tubercular disease of the eye. Ophth. Hosp. Rep., v. 12, p. 149.
Shears. Case of miliary tubercle of the choroid seen during life. Liverpool Med. Chir. Jour., v. 8, p. 504.
Schobl. Einige Worte über Choroiditis specifica und Tuberculosa. Klin. M. f. Augenh., v. 28, p. 46.
1889. Doyne. Tuberculosis of the choroid. Trans. Ophth. Soc. United Kingdom, v. 10, p. 158.
1890. Van Duyse. Tuberculose oculaire. Ann. d'Ocul., v. 104, p. 5.
1891. Carpenter. Tuberculosis of the choroid. Brit. Med. Jour., pt. 1, p. 67.
Morton. Differential diagnosis of tubercles in the choroid. Brit. Med. Jour., pt. 2, p. 169.
Valude. Origine de la tuberculose du tractus uvealis. Recherches expérimentales. Arch. d'Opht., v. 11, p. 258.
1892. Koestenitsch et Wolkow. Recherches sur le développement du tubercle expérimental. Arch. de Méd. Expér. et Anat-path., no. 6.
1894. Ginsberg. Chorioiditis exsudativa und mehrfach gestielte, polypöse Granulationsgeschwulst der Aderhaut als Pseudogliom. Centralbl. f. p. Augenh., v. 18, p. 322.
1895. Denig. Ueber die Häufigkeit der Lokaltuberkulose des Auges, die Beziehungen der Tuberkulose des Auges zur Tuberkulose der übrigen Organe, nebst Bemerkungen über die Diagnose und Prognose. Arch. f. Augenh., v. 31, p. 359.
1898. Davis. L'œil dans la méningite tuberculeuse des enfants. Rec. d'Opht., p. 110.
1899. Edington. Case of acute tuberculous choroiditis following operative treatment of tubercular lesions in a limb. Lancet, Feb. 11.
1900. Michel. Zur Kenntnis der Ursachen einer primären Iritis auf Grund einer statistischen Zusammenstellung. Münch. med. Woch., v. 25, p. 853.
1901. Carpenter and Stephenson. Report of Society for Study of Disease in Children, v. 1, p. 169.
Gruening. Case of tubercular choroiditis in conjunction with tubercular meningitis. New York Eye and Ear Infirmary Rep., v. 9.
Kunz. Drei Fälle von Tuberkulose der Uvea unter besonderer Berücksichtigung iher anatomischen Verbreitungsweise. Klin. M. f. Augenh., v. 39, p. 431.
1902. Emanuel. Ueber intrabulbäre Tuberkulose bei Kindern und Bemerkungen über die Differentialdiagnose zwischen Tuberkulose und Netzhauttumor. Klin. M. f. Augenh., v. 40, pt. 2, p. 210.
Stock. Ein Fall von Solitärtuberkulose der Choroidea. Münch. med. Woch., v. 25, p. 1067.
1903. Knapp. Case of localized tuberculosis at the head of the optic nerve. Arch. of Ophth., v. 32, p. 22.
Stock. Pathologisch-anatomische Untersuchungen über experimentelle endogene Tuberkulose der Augen beim Kaninchen. Klin. M. f. Augenh., v. 41, p. 17.
1903. zur Nedden. Beiträge zur Kenntnis der tuberkulösen Aderhautgeschwulst. Klin. M. f. Augenh., v. 41, pt. 2, p. 351.
1904. Dupuy-Dutemps. Forme glaucomateuse de la tuberculose choroidienne. Arch. d'Opht., v. 24, p. 309.
Pooley. Case of conglomerate tubercle of the choroid. Amer. Ophth. Soc., p. 256.
de Schweinitz and Schumway. Tuberculosis of the choroid, perforation of the sclera, extension posteriorly with involvement of the optic nerve, histological and bacteriological examination of the specimen. Ophth. Record, v. 13, p. 321.
1905. Cargill and Mayou. Case of general miliary tuberculosis; choroidal tubercle; complication of one disc; only physical signs during early weeks of illness. Trans. Ophth. Soc. United Kingdom, v. 26, p. 101.
de Maria. Endogene Mischinfection des Auges mit Tuberkel und Pseudo-diphtheriebazillen; Panophthalmitis tuberculosa. Klin. M. f. Augenh., v. 43, p. 90.
Harms. Fall von isolierten Chorioidealtuberkel. Ophth. Klin., no. 14.
1906. Marx. Ueber das Vorkommen von Netzhautblütungen bei Miliärtuberkulose. Münch. med. Woch., no. 35.

1907. Cargill. Solitary quiescent tubercle in the right eye, associated with tubercular glands in the neck. Ophth. Review, p. 253.
Treacher Collins. Intraocular tuberculosis. Ophthalmoscope, v. 5, pp. 1, 63, 116.
Snell. Tubercle of the choroid. Trans. Ophth. Soc. United Kingdom, v. 27, p. 156.
Stock. Tuberkulose als Aetiologie der chronischen Entzündungen des Auges und seiner Adnexe, besonders der chronischen Uveitis. Arch. f. Ophth., v. 66, p. 1.
Tay. Tubercle of the choroid, discovery of which led to the diagnosis of the tubercular disease. Trans. Ophth. Soc. United Kingdom, v. 27, p. 159.
1908. Clark and Wright. Tubercle of the choroid treated by tuberculin. Ophth. Review, v. 27, p. 195.
Ginsberg. Flacher Conglomerattuberkel der Aderhaut mit zahlreichen Bazillenhäufen Miliärtuberkulose. Centralbbl. f. p. Augenh., v. 32, p. 205.
Haas. Uber die Behandlung von Iristuberkulose mit Lufteinblasungen in die vordere Kammer. Woch. f. Therapie und Hyg. des Auges, v. 10, nos. 49 and 50.
Stephenson. Case of tubercle of the choroid. Trans. Ophth. Soc. United Kingdom, v. 28, p. 35.
1909. Carpenter. A further clinical contribution to the study of tubercles of the choroid. Trans. Ophth. Soc. United Kingdom, v. 29, pp. 180 and 228.
1909. Scheuermann. Ueber einen Fall von Solitärtuberkel der Netzhaut, der Aderhaut, und der Sehnervenkopfes, geheilt mit Neu-Tuberkulin-Bacillen-Emulsion. Zeit. f. Augenh., v. 22, p. 37.
1910. Busse. Beitrag zur Tuberkulinbehandlung bei tuberkulösen Augenerkrankungen. Arch. f. Ophth., v. 74, p. 340.
Butter. Tuberculous toxemia of eye and therapeutic and diagnostic value of injections of tuberculin. Ophthalmoscope, v. 8, p. 867.
Derby. Best methods for diagnosis and treatment of ocular tuberculosis. Arch. of Ophth., v. 39, p. 217.
Fejer. Heiling eines Solitärtuberkels der Aderhaut. Centralbl. f. p. Augenh., v. 34, p. 230.
Ginsberg. Herdförmig disseminierte Aderhauttuberkulose. Arch. f. Ophth., v. 73, p. 538.
Igersheimer. Die ätiologische Bedeutung der Syphilis und Tuberkulose bei Erkrankungen des Auges. Arch. f. Ophth., v. 76, p. 217.
Koller. Recurrent tubercular choroiditis. Amer. Ophth. Soc., v. 12, pt. 2, p. 586.
Rosenhauch. Ueber das Verhältnis phlyctänulärer Augenentzündungen zur Tuberkulose. Arch. f. Ophth., v. 76, p. 370.
Verhoeff. Histologic findings in tubercular cyclitis. Amer. Ophth. Soc., v. 12, pt. 2, p. 566.
1911. Alt. Three cases of ocular tuberculosis. Amer. Jour. Ophth., v. 28, p. 328.
Axenfeld and Stock. Tuberkulose in der Aetiologie der intraokulären Hämorrhagien und der proliferierenden Veränderungen in der Netzhaut. Klin. M. f. Augenh., v. 49, pt. 1, p. 28.
Bergmeister. Konglobierter Tuberkel der Aderhaut. Zeit. f. Augenh., v. 25, p. 131.
Cords. Jüvenile Netzhauterkrankungen. Zeit. f. Augenh., v. 26, p. 441.
Dodd and Lane. Tuberculous cyclitis following nonperforating injury to the eye. Ophth. Record, v. 20, p. 449.
Gamble. Use of diagnostic doses of old tuberculin in determining the etiology of optic neuritis and neuroretinitis of obscure origin. Ophth. Record, v. 20, p. 63.
Krusius. Zur experimentellen Tuberkulose des Auges. Deut. med. Woch., p. 1545.
Lawrie. Case of tuberculous choroiditis. Ophthalmoscope, v. 9, p. 696.
Salzmann. Tuberkulose der Choroidea unter dem Bilde des Tumors. Zeit. f. Augenh., v. 25, p. 490.
de Schweinitz and Saxon. Experimental iris tuberculosis. Ophthal. Record, v. 20, p. 41.
1911. Zentmayer. Typical tubercular sclerokeratitis. Ophth. Record, v. 20, p. 304.
Ziegler. Tuberculous cyclitis and choroiditis. Ophth. Record, v. 20, p. 372.
1912. Ager. Is phlyctenulosis a manifestation of tuberculosis? Ophthalmoscope, v. 10, p. 544.
Alexander. Tuberculosis of the uveal tract, with presentation of case. Ophthalmology, v. 8, p. 442.
Blanchard. Sur l'étiologie de la conjonctivite phlyctenulaire. La Semaine Méd., no. 12.
Bruns. Phlyctenular ophthalmia and its etiology. Ophth. Record, v. 21, p. 409.
Cabannes. Tuberculose expérimentale de la chambre antérieure de l'œil du lapin, etc. Revue Gén. d'Opht., p. 445.
Clement. Case of tubercle of the choroid. Ophth. Record, v. 21, p. 291.
Crigler. Tuberculosis of the choroid after six weeks treatment with tuberculin. New York State Journal of Med., Jan.
Gebb. Augenhintergrund-tuberkulose. Arch. f. Augenh., v. 70, p. 89.

Jakobs. Zur Solitärtuberkulose der Papilla nervi optici. Klin. M. f. Augenh., v. 50, pt. 2, p. 37.
Komoto. Solitärtuberkulose des Sehnervenkopfes. Klin. M. f. Augenh., v. 50, pt. 1, p. 82.
Marple. Tubercle of the choroid in tuberculous meningitis. Ophthalmoscope, v. 10, p. 559.
Posey. Tuberculosis of the ciliary body. Ophth. Record, v. 21, p. 263.
Rubert. Aetiologie der phlyctänularen Augenentzündung. Klin. M. f. Augenh., v. 50, pt. 2, p. 273.
Straub. Contribution to doctrine of scrofulosis. Ophthalmoscope, v. 10, p. 618.
1913. Belenky-Raskin. Aetiologie der phlyktänulären Augenentzündung. Zeit. f. Augenh., v. 39, p. 503.
Butler. Tubercular disease of the uvea. Ophthalmoscope, v. 11, p. 437.
Calmette, Guérin, et Grysez. Infection tuberculeuse expérimentale du cobaye par la conjunctive oculaire. Soc. de Biologie, v. 74.
Fleischer. Tuberkulöse Natur der Periphlebitis adolescentium. Klin. M. f. Augenh., v. 51, pt. 2, p. 245.
Fuchs. Zur Behandlung der Irido-cyclo-choroiditis tuberculosa. Klin. M. f. Augenh., v. 51, p. 134.
Wirtz. Ueber Beziehungen der rheumatischen Augenkrankungen zur secundären Tuberkulose. Klin. M. f. Augenh., 1913, May, p. 607.
1914. Fleischer. Juvenile Periphlebitis retinæ, eine echte Gefässtuberkulose der Netzhaut. Klin. M. f. Augenh., v. 52, p. 769.
Gilbert. Ueber intraokuläre Tuberculose. Münch. med. Woch., v. 61, p. 306.
Stephenson. Bacillus of bovine tubercle as a factor in phlyctenular disease of the eye. Lancet, v. 187, p. 153.
Stock. Blütungen in der Retina bei Miliärtuberkulose. Klin. M. f. Augenh., v. 52, p. 75.
Stuelp. Ursächliche Zusammenhang chronischer Augenkrankheiten mit dem sogenannten chronischen Gelenkrheumatismus, imbesondere Polyarthritis ankylosans und deformans. Zeit. f. Augenh., v. 32, p. 341.
Theobald. The etiology of phlyctenular ophthalmia. Jour. Amer. Med. Assoc., v. 63, p. 566.
Verhoeff. Chronic ocular tuberculosis. Jour. Amer. Med. Assoc., v. 63, p. 13.
1915. Ibershoff. Conglomerate tubercle of choroid. Jour. Ophth. Otol., and Laryng., v. 21, p. 331.
Jackson. Tuberculosis of choroidal vessels. Annals of Ophth., v. 24, p. 416.
Otori. Experimental primary retinal tuberculosis. Arch. f. Augenh., v. 79, p. 44.
Stark. Present status of tuberculosis of eye. Ariz. Med. Jour., Nov.
Stilwill. Kerato-irido-cyclitis. Annals of Ophth., v. 24, p. 413.
Ziegler. Multiple tubercles of iris. Trans. Coll. Phys., Phila., v. 36, p. 291.
1916. Black. Retinitis proliferans. Annals of Ophth., v. 25, pp. 210 and 397. Ophth. Record, v. 25, p. 308.
Brown and Irons. Etiology of iritis. Trans. Amer. Ophth. Soc., v. 14, p. 495.
Jackson. Tuberculosis of retinal vessels. Arch. of Ophth., v. 45, p. 552.
Jackson. Tuberculosis of retina, recurring hemorrhages, and retinitis proliferans. Annals of Ophth., v. 25, p. 84.
Knapp. Scleritis where tubercle bacillus was cultivated from aqueous. Arch. of Ophth., v. 45, p. 284.
Posey. Sclerosing keratitis. Annals of Ophth., v. 15, p. 427.
Suganuma. Experimental study of retinitis proliferans. Ophthalmology, v. 12, p. 789.
1917. Goldbach. Lymphatic nodular keratoconjunctivitis. Jour. Amer. Med. Assoc., v. 69, p. 102.
Jackson. Choroidal tuberculosis and atrophy. Ophth. Record, v. 26, p. 468.
Lang. Causes of iritis. Lancet, v. 1, p. 956.
Zentmayer. Tuberculosis of anterior segment of globe. Annals of Ophth., v. 26, p. 215.
1918. Black. Uveal tuberculosis. Amer. Jour. Ophth., v. 1, p. 341.
Boyd. Uveitis with punctate keratitis. Amer. Jour. Ophth., v. 1, p. 340.
Gilbert. Ueber tuberkulöse Gefässhautenzündung. Deutsche Ophth. Gesell., p. 16.
Oloff. Ueber tuberkulöse Erkrankungen des Sehnerven. Klin. M. f. Augenh., v. 60, p. 552.
Risley. Tuberculous keratitis. Amer. Jour. Ophth., v. 1, p. 281.
1919. Fraser. Iritis. Canadian Med. Assoc. Jour., v. 8, p. 664.
Gilbert. Zur Klinik und pathologischen Anatomie der disseminierten Aderhauttuberkulose. Arch. f. Augenh., v. 84, p. 153.
1920. Axenfeld. Periphlebitis retinæ Tuberculosa. Deutsche Ophth. Gesell., v. 42, p. 298.
Davis. Recurrent retinal hemorrhage of adolescence. Amer. Jour. Ophth., v. 3, p. 657.

Eppenstein. Uber primäre Tuberkulose der Netzhaut. Arch. f. Ophth., v. 103, p. 154.
Meissner. Zur Periphlebitis adolescentium. Klin. M. f. Augenh., v. 64, p. 392.
Veeder and Hempelmann. Phlyctenular conjunctivitis and its relation to tuberculosis. Arch. of Pediatrics, v. 37, p. 396.
Zentmayer. Recurrent retinal hemorrhages. Amer. Jour. Ophth., v. 3, p. 652.
1921. Block. Posttraumatische Tuberkulose des Auges. Klin. M. f. Augenh., v. 67, p. 581.
Finnoff. Impressions derived from study of recurrent hemorrhages into the retina and vitreous of young persons. Trans. Amer. Ophth. Soc., v. 19, p. 238.
Guillery. Experimenteller Beitrag zur Beziehungen zwischen Phlyctänen und Tuberkulose des Auges. Münch. med. Woch., v. 68, p. 201.
Igersheimer. Experimentelle und klinische Untersuchungen zur Tuberkulose des Auges. Arch. f. Ophth., v. 105, p. 640.
Jendralski. Radiotherapeutische Erfahrungen bei Tumoren und Tuberkulose des Auges. Klin. M. f. Augenh., v. 66, p. 96.
1922. Cibils. Phlyctenular conjunctivitis and relation to tuberculosis. Rev. de Hig. y de Tub., v. 15, p. 65.
Finnoff. Technique for producing experimental ocular tuberculosis in animals. Trans. Amer. Ophth. Soc., v. 20, p. 291.
Neame. Tuberculous iridocyclitis and parenchymatous keratitis of left eye with tuberculous conjunctivitis of the right, and tubercular lymphadenitis. Brit. Jour. Ophth., v. 6, p. 204.
Römer and Schall. Zusammenhang der skrofulösen Keratoconjunctivitis mit der Tuberkulose. Klin. M. f. Augenh., v. 69, p. 128.
Scheerer. Roentgenbestrahlung bei Iristuberkulose. Klin. M. f. Augenh., v. 68, p. 186.
Suganuma. Pathologisch-anatomischen Veränderungen der juvenilen rezidivierenden Netzhautglaskörperblutung. Klin. M. f. Augenh., v. 68, p.481.
Whitehead. Ocular tuberculosis. Brit. Jour. Ophth., v. 6, p. 529.
1923. Cummings. Hemophthalmus with tuberculous foci in choroid. Brit. Med. Jour., no. 3279, p. 809.
Funaishi. Experimentelle Untersuchungen über die Aetiologie der phlyctanulären Augenentzündung. Klin. M. f. Augenh., v. 71, p. 141.
Gilbert. Ueber Uveitis. Zeit. f. Augenh., v. 50, p. 267.
Igersheimer. Tuberkulose und Auge. Klin. M. f. Augenh., v. 71, p. 226.
Libby. Destructive intraocular tuberculosis. Amer. Jour. Ophth., v. 6, p. 998.
Stark. Effect of general tuberculosis on the eye, with a report of frequently overlooked symptoms. Amer. Ophth. Soc., v. 21, p. 290.
Stock. Ueber metastatische Ophthalmie durch Tuberkelbazillen. Klin. M. f. Augenh., v. 70, p. 356.
Stoewer. Tuberkulose und Sehnervenentzündung. Zeit. f. Augenh., v. 51, p. 325.
Teal and Woodward. Early diagnostic retinal signs of tuberculosis. Trans. Amer. Acad. Ophth. and Otolaryng., p. 155.
1924. Aurand et Bussy. Tuberculose chorio-rétinienne simulant un gliome rétinien. Lyon Méd., v. 133, p. 124.
Derkac. Beitrag zur chronischen geschwulstartigen Aderhauttuberkulose. Zeit. f. Augenh., v. 54, p. 212.
Finnoff. Ocular tuberculosis, experimental and clinical. Arch. of Ophth., v. 53, p. 130.
Finnoff. Changes in eye of rabbit following injection of dead tubercle bacilli into common carotid artery. Amer. Jour. Ophth., v. 7, p. 365.
Lowenstein. Die Tuberkulose des Auges. (Urban und Schwarzenberg, Berlin, Vienna.)
Mauksch. Zur Differentialdiagnose zwischen Gliom und Tuberkulose. Zeit. f. Augenh., v. 54, p. 49.
Wassing. Beitrag zur Strahlenbehandlung Tuberkulöser Augenkrankheiten. Klin. M. f. Augenh., v. 72, p. 175.
1925. Finnoff. Uveal tuberculosis. Amer. Jour. Ophth., v. 8, p. 241.
Frank. Perivasculäre Tuberkuloseverbreitung im Auge. Zeit. f. Augenh., v. 57, p. 301.
Savin and Preston. Problem of phlyctenular child. Lancet, v. 208, p. 965.
Scheerer. Roentgenbestrahlung der Uvealtuberkulose. Klin. M. f. Augenh., v. 75, p. 27.
1926. Argañaraz and Lagleyze. Relapsing vitreous hemorrhages. Arch. de Oft. de Buenos Aires, v. 1, p. 357.
Cattaneo. La tuberculosi della coroide. Ann. di Ottal., v. 54, pp. 673 and 801.
Di Marzio. Uveitis chronica anterior. Boll. d'Ocul., p. 244.
Dowling and Brown. Conglomerate tubercle of choroid. Jour. Ophth., Otol., and Laryng., v. 30, p. 199.

King. Tubercular iridocyclitis as observed with the slit-lamp; remarks on tuberculin treatment. Arch of Ophth., v. 55, p. 563.
Löwenstein. Zur Klinik der Augentuberkulose. Klin. M. f. Augenh., v. 76, p. 812; v. 77, p. 67.
Merz-Weigandt. Trauma als Ursache einer beiderseits auftretenden Sclerokeratitis tuberculosa. Klin. M. f. Augenh., v. 76, p. 412.
Riehm. Experimentelle Konjunktivitis und Keratitis phlyctenularis. Arch. f. Ophth., v. 117, p. 331.
Stock. Strahlenbehandlung in der Augenheilkunde. Klin. M. f. Augenh., v. 76, p. 542.
Weeks. Tuberculosis of eye. Amer. Jour. Ophth., v. 9, p. 243.
Werdenberg. Theorie und Praxis der Augentuberkulose nach Erfahrungen im Hochgebirge. (F. Enke., Stuttgart.)

1927. Bergmeister. Die tuberkulösen Erkrankungen des Auges. Abh. aus der Augenheilkunde. (S. Karger, Berlin.)
Braun. Roentgenbehandlung der Choroiditis tuberculosa. Klin. M. f. Augenh., v. 79, p. 187.
Derby and Carvill. Anterior ocular tuberculosis. Arch. of Ophth., v. 56, p. 523.
Martenstein. Erfahrungen über die Behandlung der Iristuberculose mit Roentgenstrahlen. Klin. M. f. Augenh., v. 78, p. 643.
Meesmann and Reichling. Behandlung tuberkuloser Augenkrankheiten mit einem neuen Tuberkulin. Klin. M. f. Augenh., v. 79, p. 629.
Montalti. La tuberculosi sperimentale dell'iride. Ann. di Ottal., v. 55, p. 555.
Mylius. Strahlenbehandlung tuberkulöser Erkrankungen des vorderen Augenabschnittes. Zeit. f. Augenh., v. 61, p. 230.
Richter. Roentgenbehandlung der tuberkulöser Iridocyclitis. Klin. M. f. Augenh., v. 78, p. 91.
Riehm. Aetiologie der Phlyctäne. Klin. M. f. Augenh., v. 79, p. 814.
Suganuma. Ueber die Entstehungsweise der Gefässtuberkulose der Netzhaut. Arch. f. Ophth., v. 118, p. 443.
Werdenberg. Ueber Lungenbefund bei Augentuberkulose. Klin. M. f. Augenh., v. 78, Beilageheft, p. 238.

1928. Berghausen. Tuberculin therapy in ocular tuberculosis. Arch. of Ophth., v. 57, p. 583.
Derby. Nature of so-called Koeppe nodules. Arch. of Ophth., v. 57, p. 561.
Safar. Ueber Drucksteigerung im Gefolge der juvenilen Netzhautglaskörperblütungen, usw. Arch. f. Ophth., v. 119, p. 624.
Scheerer. Roentgenbestrahlung der Uvealtuberkulose. Klin. M. f. Augenh., v. 78, p. 186.

1929. Krückmann. Ursprungsstätten der Augentuberkulose mit Berücksichtigung der intrathorakalen Verhältnisse. Klin. M.f. Augenh., v. 82, p. 117.
Urbanek. Die Bedeutung der Tuberkulose für die entzündlichen Erkrankungen des Uvealtractus. Abhandlungen aus der Augenheilkunde und ihren Grenzgebieten. (S. Karger, Berlin.)
Wilmer. Clinical aspects of ocular tuberculosis. Amer. Jour. Ophth., v. 57, p. 1.

A CLINICAL STUDY OF SIXTEEN CASES OF OCULAR TUBERCULOSIS

G. F. SUKER, M.D.
AND
BEULAH CUSHMAN, M.D.
CHICAGO

A group of cases watched for periods ranging from six months to two and a half years seems to support the belief that chronic inflammatory diseases are frequently tuberculous, and that selected cases may be treated beneficially with tuberculin. Emphasis is laid on the principle that in these cases general care it just as important as specific therapy. Improper nourishment may be just as important in the onset of tuberculous infection as proper nourishment is in its cure. Sixteen private cases are briefly reported. Read before the Chicago Ophthalmological Society, February 17, 1930.

So much has been written on ocular tuberculosis, especially of late, that we hesitate to report our cases, but do so that our results may help in establishing a definite line of treatment. There is much confusion about tuberculosis of the eye, as many clinicians do not recognize it as an entity, and others feel that tuberculin should not be used. Only as these cases are recognized and the remedy applied shall we develop a systematic treatment.

F. M. Pottenger recently read a paper on allergy in clinical tuberculosis, which may help somewhat in interpreting the many different manifestations of tuberculosis. He states that Koch's phenomenon has been within our grasp for forty years but that like most great basic truths a prodigious amount of thought and labor has been required to clarify it.

Koch's well known phenomenon is that an animal which is immune to tuberculosis through a previous infection reacts differently to the second dose of bacilli, producing very different results from the primary infection. This is the basis of the immunological approach to tuberculosis and has been made the basis of study of the immunity reaction in other diseases as well.

Pirquet explained the changed reaction of body cells toward bacilli and bacillary protein, in the immune animal, as compared with the one primarily infected. To the phenomenon met with in the reinfected he gave the name "allergy", and he carefully studied many phases of the reaction.

Krause, in his studies on allergy in experimental tuberculosis, says:

"For our purpose immunity is regarded as that condition of increased specific resistance to implantation and extension of tubercle bacilli, and allergy as that state of tissue hypersensitiveness to tuberculoprotein that comes into existence with the earliest formation of the specific anatomical tubercle. Both immunity and allergy continue to work within the body as long as the tubercle and its tubercle bacilli persist".

Allergy is established by the primary inoculation. In experimental tuberculosis, the time of the appearance of allergy varies with the dosage of bacilli, coming on after a few days with large quantities of bacilli and after two or three weeks when a few bacilli are responsible. The same probably holds true for man.

With the study of the pathological processes in the living, research students have recognized the tuberculoprotein (tuberculin) as the natural curative substance, and feel that they can only aid the body by increasing the dose of tuberculin from time to time, as indicated by the sensitivity of the individual.

This allergic reaction to tubercle bacilli seems to provide a suitable theory for many of the ocular manifestations of tuberculosis and, indeed, seems to explain why satisfactory results are obtained in the use of tuberculin in cases of a chronic tuberculous nature, while it is of no value in the acute miliary form.

Expressed briefly the **history of ocular tuberculosis** as Ginsburg states in Henke and Lubarsch's "Handbook

of special pathological anatomy and histology" is that the differentiation between an acute tuberculous destructive process and the chronic tuberculous condition of the eyes has been generally understood only during the past ten or twelve years.

As early as 1855 Graefe described a solitary tubercle of the choroid in a pig's eye, and in 1858 Jaeger and Manz separately described cases in which the eyes were involved in miliary tuberculosis. In 1863 Busch described a case of miliary tuberculosis with twenty-three tubercles in the choroid.

In 1867 Cohnheim made the same anatomical description of tubercles as Busch. He found them in the chorio-capillaris and considered their origin to be from lymphoid cells.

In 1873 Perls described the first recorded case of tuberculous iridocyclitis in a man with a conglomerate tubercle of the iris and miliary tubercles of the retina. During the following years several cases were described, and in 1878 Haab described granuloma iridis as of a tuberculous nature.

A little later Michel and his school suggested tuberculosis as the primary etiology of many chronic inflammatory changes of the uvea.

Later descriptions have pointed out that chronic tuberculous lesions tended to heal with the formation of fibrous tissue, causing a thinning of the coats involved.

Rarely has the tubercle bacillus been isolated in these chronic ocular lesions, and this has caused many oculists to doubt that the eye is affected. But the pathological picture is typical of a tubercle in every other respect and the tubercle bacillus has so often been found in and isolated from the tubercle that the identity of tubercle in the eye should not be questioned.

Finnoff has produced experimentally destructive or acute lesions in all the tissues of the eye except the lens, by injecting tubercle bacilli into the internal carotid arteries.

The cases we wish to report have been watched for from six months to two and one-half years, and this is only given as a preliminary report. We realize that cases diagnosed as tuberculous and treated with tuberculin and general therapy must be watched over a long period of time in order to study the chronic course and especially for the relapses which are so common in the tuberculous process.

In 1927 Derby and Carvill reported on 63 out of 130 clinic cases of anterior ocular tuberculosis, which had been diagnosed and treated at the Massachusetts Eye and Ear Infirmary from 1909 to 1917. Tuberculin treatment and general care had been guided very carefully. Of the sixty-three cases all except seven had recurrences, and the number of recurrences varied from two to sixteen during the eighteen years. The recurrences ranged in severity from very mild conjunctival and ciliary injection to destructive inflammation of the eye which involved months of hospital care.

In this group the mortality was very high, eleven patients or seventeen percent dying within the length of time covered, and six of these eleven dying of pulmonary tuberculosis. All of these patients were clinic patients and were taken care of through the Massachusetts Eye and Ear Infirmary in association with the medical department of the Massachusetts General Hospital.

Derby and Carvill came to the conclusion that tuberculin treatment in itself had no specific or lasting effect. In the discussion of their paper Verhoeff agreed with them and said that he had given up the use of tuberculin years before.

Urbanek of the First Eye Clinic of Vienna has recently published a most elaborate and detailed monograph on the "Importance of tuberculous inflammations of the uveal tract". He emphasizes the value of tuberculoprotein, using a preparation of the toxins called "tebeprotein" in preference to the tubercle bacilli. He records very beautiful results.

Many other papers have appeared, some authors feeling that tuberculin is of great value in the treatment of ocu-

lar tuberculosis, and others leaning just as strongly toward a pessimistic point of view.

King, in an article on tuberculin, recently published a table giving the statistics on treated cases reported in the literature. In the combined reports of 528 cases treated by authors who felt that tuberculin treatment was beneficial, 51.1 percent were healed, 31.8 percent were improved, and 15.5 percent were unimproved. King himself believes that tuberculin is of great value in the treatment of ocular tuberculosis, and that further progress in tuberculin therapy is only a matter of time. He contends also that its use in properly selected cases will avoid loss of sight and needless suffering.

Spontaneous cure of tuberculous lesions elsewhere in the body is common, as the autopsy findings show. The frequent self-limited course or spontaneous healing of ocular tuberculosis lesions makes the question of treatment much more difficult to analyze. As chronic tuberculous lesions tend to heal with the formation of fibrous tissue, the resulting scars are minimum.

The senior writer of this paper, until two and one-half years ago, had referred ocular tuberculous cases to the internist for tuberculin injections, but he has found that by treating them in the office of the ophthalmologist the progress is much more satisfactory and the cooperation of the patient is much more easily retained.

After the diagnosis was made, we advised our patients that a long course of treatment would be necessary, and that unless we had their cooperation it would be useless to start. We also advised them that general care was as important as any local treatment, and we used rest, diet, cod liver oil, and ultraviolet radiation as well as tuberculin and local medicaments as indicated.

The quite satisfactory results obtained so far in most of these private patients of our group as compared with the clinic patients of the Derby and Carvill group may be attributed to the continued cooperation of our patients, who for the most part came to us early in the course of their ocular disease, and their immediate return for further treatment when any change occurred in the condition of their eyes.

Credit also must be given to the general care that they have been able to have, so that their general physical improvement has been very marked. They have been advised of the factor of tuberculous sensitivity and of the tendency to relapses. They have been taught that the way to lessen these risks is to keep fit generally with rest, food, and exercise; and that tuberculin may be necessary occasionally, even after apparent cure.

Diagnostic doses

We used the old tuberculin of Koch for the diagnostic injections in ascending doses, after a normal temperature record of forty-eight hours and after the general negative examination. The patients were not hospitalized, and the ascending doses were given at forty-eight-hour intervals until 10 mg. were given, unless a reaction occurred before this. If no sensitivity was evident with 10 mg. of old tuberculin, the inflammatory process was not considered tuberculous. General malaise after any injection was regarded as suspicious of a positive reaction, and the increase in the dosage for a temperature reaction would be very cautious, to safeguard any possibility of exciting the latent foci, which might be in the chest or elsewhere in the body. Also, with any retinal involvement, the increased dosage was watched with great care that no focal reaction should occur.

Reactions

The reactions varied from a rise in temperature to between 99 and 102.4 degrees, and the local reactions were very definitely positive. We have had no ill effects in a focal reaction with the carefully guarded diagnostic doses, but rather have noted a definite improvement in the eyes with the increased doses, as Wilmer also stated in his clinical report in 1926. This improvement would be shown by a decrease in

the pain and injection and a decrease in the number of cells in the anterior chamber. The pupil would dilate more promptly, and improvement would be noted from that time. This in itself might be cause enough for diagnosis, as in those cases which were not tuberculous we have noted no ill effects with the 10 mg. dosage, and no improvement.

Nonspecific proteins were used in several cases as treatment, with apparently no effect on the tuberculous lesions either for good or bad. Wilmer reported that milk injections had caused a marked focal reaction, where they had been added with the hope of accelerating recovery after tuberculin treatment, and he felt that they had helped in some cases. In our case number 11, foreign proteins were given with the hope that the tolerance for tuberculin would be increased, but no increase in tolerance was found.

Vaccine used

For treatment the vaccine against tuberculosis prepared by the Von Ruck Laboratories of Asheville, North Carolina, was used. This vaccine is made up from virulent strains of human and bovine types of tubercle bacilli, and it contains all the soluble body substances and the metabolic products of the bacilli in definite proportions.

The doses were regulated entirely by the individual response, and if only the minimum dose could be tolerated it was repeated as tolerated, usually once a week. The treatment was continued until the process seemed well healed, and our aim was to continue the treatment until the patient could tolerate,

Summary A

Case	Sex	Age	Lesion	Vision		Dose	Temp.	Reaction		Comp. fix. tuberculosis
				before treatment	after treatment	Mg.		focal	general	
1	F.	60	R. and L. cyclitis	R. 1.5 L. 1.5	1.5 1.5	1/10	102.4	V. blurred	marked	
2	F.	25	R. and L. central choroid	R. 0.2 L. 1.0	0.2 1.0+2	1	101	0	marked	
3	F.	23	L. choroid	R. 1.5 L. 0.8	1.5 1.5	10	99	V. blurred	mild	
4	F.	30	R. retina	R. 1.5 L. 0.2	1.5 0.4					
5	M.	30	R. retina	R. fingers at 1 foot L. 1.5	light per. 1.5	5	99	0	marked	++++
6	F.	32	R. and L. central choroid	R. 0.8+3 L. 0.8+3	1.0 1.0	2	101	V. blurred	marked	
7	F.	47	R. sclera	R. 0.8 L. 1.0	0.8+1 1.0	1/10	101.4	0	mild	
8	F.	36	sclera	R. 0.8−3 L. 0.8−3	0.8 0.8	2/10	102.4	0	marked	
9	F.	23	R. sclera	R. 1.0 L. 1.0	1.5 1.2+2	1/10	99	0	mild	

NOTE: Wassermann and Kahn negative in all cases. 2, 5, 9 under tuberculin treatment to date.

Summary B

Case	Sex	Age	Lesion	Vision		Dose mg.	Temp. °F.	Reaction		Comp. fix.tuberculosis
				before	after			focal	general	
10	F.	48	R. and L. iridocyclitis	R. 1.2 L. 0.3−1	1.2 0.6	1	102	0	moderate	
11	F.	33	L. iris tubercle (conglomerate)	R. 1.2 L. 0.3−1	1.2 0.8	1	101.2	V. blurred	marked	+++
12	F.	35	R. iridocyclitis	R. 0.1 L. 1.5	light per. 1.5	1/10	99.4	0	moderate	
13	F.	27	R. iridocyclitis	R. 0.2 L. 0.6−2	0.3 0.6−2					
14	F.	53	R. and L. iridocyclitis	R. 0.1−1 L. 0.8−2	1.5−2 1.5−2	5	101	0	moderate	
15	M.	35	R. and L. keratoconjunctivitis	R. 1.0 L. 1.0	1.5 1.5	3/10	100	0	moderate	+++
16	F.	28	Meninges	R. 0.6+3 L. 0.8+3	1.0 1.0	1/10	99	V. blurred	severe	++++

NOTE: 10, 11, 14, 15, and 16, still under treatment; 12, complicated by secondary glaucoma. Wassermann and Kahn negative in all cases. Provocative Wassermann negative in case 11.

without reaction, double the amount which had been required for the positive intradermal diagnostic test. Furthermore the advice to the patient to continue to be careful of his general condition was repeated.

General condition

In each case a complete physical examination was made by a competent diagnostician, and all foci of infection, such as infected tonsils, sinuses, and any infection about the teeth, were cleared up as far as possible. Negative uterine cervical cultures were reported in the female patients. Wassermann and Kahn reactions were negative in all cases, and a negative provocative Wassermann was obtained in one case which seemed clinically very definitely one of a gumma at the root of the iris.

Roentgen examinations made of the chests showed no activity at the time, though patients 1 and 2 did show suspicious scarring. Clinically, patients 1, 2, 3, and 10 had the appearance of being phthisical individuals when they came in for the eye examination, and they had been examined at different times for pulmonary involvement, but no activity in the chest was found at any time.

It is also interesting to note that in all of these patients the pathology of the eyes followed marked general physical exhaustion. Patients 9 and 10 (women aged forty-seven and forty-eight years), had been on strict reducing diets, one losing seventeen and the other forty pounds. Case 1 followed extreme physical exhaustion due to teaching a summer course in a strange subject and doing some further study along her line of special interest. Case 2 followed five months after the birth of a baby, the previous eye having been affected when in college three years previously, working her way and finding time to study. Cases 3 and 16 were in young women who kept their weight around 130 pounds by carefully dieting and worked hard, from twelve to sixteen hours daily. Case 8 yielded the definite history of having procured the milk for the family from an infected herd of cows.

Tuberculin injections

In using tuberculin as a treatment, the only difficult feature of the treat-

ment, if there is any, is that the dosage must be regulated according to the individual reaction. A standard is set, but we have not been able to follow it in any case. The increasing dosage had to be regulated and in several cases we could not increase the minimum dose. We found it true also, as Urbanek reported, that in women the reaction to the dose of tuberculin was noted more often if given during the early days of menstruation. We found this true in five women out of the ten treated.

In view of the fact that ocular tuberculous lesions are self-limited, we hesitate to claim too much for the treatment. But after watching the patients clinically, the improvement in their eye condition began so rapidly and continued so regularly, in contrast with their history of the duration of the process, that we feel that the tuberculous condition was definitely shortened by the use of tuberculin and the general care.

Case records

In reporting the clinical cases the form that Dr. Wilmer used in his clinical report is followed, as it is concise and only the positive facts are given.

Case 1: Miss J. Y. Age 60 years. Ht. 5′ 7″. Wt. 135 lbs. Came March 4, 1927.

Complaint: Floaters and blurring of vision for the past nine months.

Family history: Mother died with tuberculosis when patient was a young woman. Only brother died of a heart complication after living in Denver with pulmonary tuberculosis for many years. Father died at eighty years of age of senile changes.

Fig. 1 (Suker and Cushman). Right fundus of case 2.

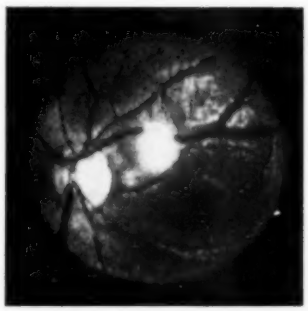


Fig. 2 (Suker and Cushman). Left fundus of case 2.

Present illness: Blurring of vision began in August, 1926, and continued about the same, with the clouds getting heavier and thicker, so that she had to shift her eyes to be able to read. Tonsils removed, septum straightened, and sinuses drained, with increased eye symptoms.

Present examination: Fibrosis right apex. Intradermal tuberculin test was positive (1/10 mg.). R.V. 1.5; L.V. 1.5.

Ophthalmoscopic examination: R. and L.E. showed few old posterior corneal precipitates, circulation in the anterior chamber, vitreous studded with cells and a loss of its contour, more marked in L.E.

Diagnosis: R. and L.E. uveitis (tuberculous) with cellular infiltration and secondary changes in the vitreous.

Treatment: Tuberculin injections were begun April 8, 1927, with 0.0005 mg., and continued until September, 1928.

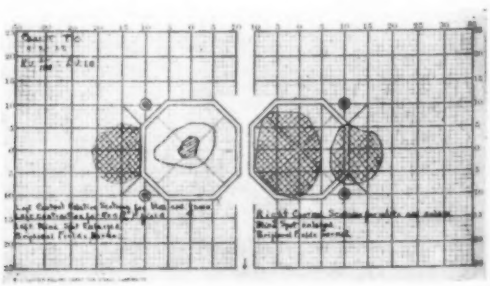


Fig. 3 (Suker and Cushman). Central fields of case 2.

Discharge note: March, 1929: R.V. 1.2 + 4; L.V. 1.0 + 3. Both lenses show beginning sclerosis, no doubt secondary to the changes in the vitreous.

Case 2 (illustrations 1, 2, 3): Mrs. T.O. Age 25 years. Ht. 5′ 5½″. Wt. 130 lbs. Came Nov. 2, 1928.

Complaint: Loss of right vision three years previously and blurred vision of L.E. as it started in R.E.

Past history: Three years previously, while a senior in college, noticed blind spot in right eye while reading. Local and general treatment had no effect. Was not tested with tuberculin.

Present illness: Left vision became blurred in October, 1928, three months after the birth of her babe.

Present examination: R.V. fingers at 1 ft. (eccentric). L.V. 1.0+2. Right central scotoma. Left relative central scotoma to blue and green (0.5°). Intradermal tuberculin test positive (1 mg.).

Ophthalmoscopic examination: R.E. Hole in macula with well pigmented borders. L.E. Blurring of macular region, with two yellowish areas above and temporal from the foveal reflex. Loss of vitreous contour of both eyes with no cellular infiltration.

Diagnosis: R.E., healed central choroiditis. L.E., active central choroiditis (tuberculous).

Treatment: Tuberculin therapy started Nov., 1928, given by Dr. Tell Nelson. Babe taken from breast; rest and diet. Drs. Lichtenberg and Lemoine in Oct., 1929 report her vision L.E. 1.0 and local condition cleared up.

Case 3 (illustration 4): Miss K.W. Age 23 years. Ht. 5′ 3½″. Wt. 115 lbs. Came Jan. 4, 1929.

Complaint: L.V. became blurred ten days before.

Past history: Negative except for general physical exhaustion five years before, and was examined carefully for a possible pulmonary tuberculosis. At that time she had a slight blur over her left eye which lasted three or four days.

Present examination: R.V. 1.5. L.V. 0.8 — 2. R.E. normal. L.E. Healed choroidal tubercle with well pigmented borders and an active lesion just below in the upper outer temporal quadrant of the fundus. Extensive exudate reaching forward in Cloquet's canal, and blurring of the disc. Intradermal tuberculin test positive (10 mg.).

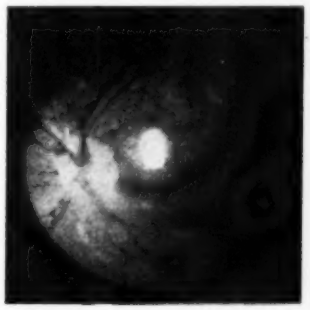


Fig. 4 (Suker and Cushman). Left fundus of case 3.

Diagnosis: Tubercle of choroid L.E.; a healed and an active lesion.

Treatment: Tuberculin injections started Jan. 29, 1929, with 0.00025 mg., and continued once a week. The last dose, 0.65 mg., was given Dec. 2, 1929.

Discharge note: Five lbs. gain in wt. L.V. 1.5. Advised as to general care.

Cases 4, 5, 6: Came in with retinal and choroidal involvement, two with recurrent retinal hemorrhages and the other with a central choroiditis. All of these patients showed a definite reaction to old tuberculin and improvement with the treatment, but the treatment was referred back to the doctor who sent them in and we shall not report on them other than to include them in the table, but according to the last reports they are improving very satisfactorily.

Case 7: Mrs. C. Age 47 years. Ht. 5′ 2″. Wt. 150 lbs. Came Dec. 22, 1928.

Complaint: Pain, redness, and swelling R.E.

Present illness: Painful nodules had been present in R.E. for four months. Tonsils and dead teeth had been re-

moved with no improvement in the condition of the eye.

Eye examination: R.V. 0.8; L.V. 1.0 + 3. Right scleritic nodule and a thinning and darkening of the sclera in four other areas about the limbus. Iris slightly discolored and pigment deposit on anterior surface of lens. Circulation in anterior chamber. L.E. normal. Fundi negative. Intradermal tuberculin test positive (0.5 mg.).

Diagnosis: R.E. scleritis and iridocyclitis (tuberculous).

Treatment: Tuberculin injections were begun Jan. 3, 1929. The nodule disappeared by Jan. 19, 1929. The injections were continued until April 30, 1929, in gradually increasing doses. Thyroid gr. 0.25 and x-ray treatments.

Follow-up note was received in August, 1929, and there had been no relapses.

Cases 8, 9: Each showed a definite nodular scleritis and both were definitely positive to the old tuberculin diagnostic injections, while all other tests were negative. With the treatment the pain and the nodules cleared up very promptly. But they were from out of town, and after two and three months respectively with no recurrences they left without continuing their treatment. As each case could only take the minimum dose of tuberculin, we felt that the treatment was not completed.

Case 10: Mrs. S. Age 48 years. Ht. 5′ 1″. Wt. 130 lbs. Came April, 1929.

Complaint: Pain and gradual loss of vision in left eye.

Past history: The eye trouble began after losing fifteen pounds on a reducing diet.

Present illness: Frequent headaches and pain in left eye began twelve months ago. Local and general treatment had caused no change.

Present examination: R.V. 0.8 — 1. L.V. 0.1. R. and L. iridocyclitis; circulation in anterior chambers. No iritic adhesions; deposits on posterior corneal surface.

Diagnosis: R and L. iridocyclitis (tuberculous).

Treatment: Tuberculin injections were begun April 23, 1929. Posterior precipitates and circulation in anterior chamber disappeared in six weeks.

Discharge note: Feb. 15, 1930. R.V. 1.0. L.V. 0.5 (with glasses). Gain in weight of seventeen pounds, and general health greatly improved.

Case 11 (illustration no. 5): Mrs. E.L. Age 33 years. Ht. 5′ 5½″. Wt. 130 lbs. Came Sept. 30, 1929.

Complaint: Pain and poor vision in L.E.

Present illness: Pain and redness of left eye for six weeks, pain increasing and almost intolerable the past week. Has been treated for an iritis.

Present examination: R.V. 1.2. L.V. 0.3 — 1. Large nodule in iris in upper nasal quadrant. Dense circulation in the anterior chamber, posterior bedewing. No posterior precipitates, pupil well dilated. Tension Schiøtz, R. 15.

Fig. 5 (Suker and Cushman). Case 11.

L. 31 mm. Complement fixation for tuberculosis 2 plus. Intradermal tuberculin positive (1 mg.). Provocative Wassermann negative.

Diagnosis: Tuberculoma of iris.

Treatment: Tuberculin injections begun Oct. 14, 1929 and continued to date. Radium for persistent menorrhagia. (No tuberculous changes in

endometrium.) Tonsillectomy advised.

Follow up note: Feb. 1, 1930, no pain, and mass has almost entirely disappeared; few cells only in anterior chamber. L.V. 0.8.

Cases 12 and 13: These were old cases of iridocyclitis, which had been treated for six months and a year respectively as due to focal infection and all available foci had been removed with no improvement. The vision was practically lost in the eyes affected and, although they each gave a very definite positive reaction to the old tuberculin tests, their eyes were in such a degenerate condition that we did not urge treatment. Case 12 went on to a secondary glaucoma and no doubt will need to have an enucleation.

Case 14: Mrs. B. Age 53 years. Ht. 5′ 3″. Wt. 139 lbs. Came Nov., 1928.

Complaint: Pain in both eyes and blurred vision.

Present illness: For three months the vision had been blurred and the eyes red. Dull pain most of the time in both eyes.

History: Milk for family had been obtained from a herd of cows that had recently been pronounced tuberculous.

Present examination: R.V. 1.0. L.V. 0.8. Two broad iritic adhesions in the right and three in the left eye. Large mutton-fat deposits on posterior surface of cornea. Circulation in anterior chamber. Many nodules in each iris, with exudate. Three located near the pupillary margins in right eye at six o'clock position. Intradermal tuberculin test positive (5 mg.).

Diagnosis: Iridocyclitis (tuberculous, probably of bovine type).

Treatment: Tuberculin injections and general therapy.

Discharge note: R.V. 1.5. L.V. 1.5, with the original adhesions persistent, but no further involvement. Gain in weight of eight pounds and general condition markedly improved.

Case 15: Mr. B. Age 33 years. Ht. 5′ 6″. Wt. 125 lbs. Came July 18, 1929.

Complaint: Attacks of conjunctival irritation and redness of both eyes with some discharge, which would last for seven to ten days, occurring frequently during the past two years. Eight dead teeth and tonsils had been removed with no changes in the eye condition.

Examination: R.V. 1.5. L.V. 1.5. Small nodules millet seed in size and phlyctenule-like in character were present in each conjunctiva, three in the right and four in the left. Each cornea showed superficial scars and areas of staining resembling Fuchs's keratitis subepithelialis punctata. Intradermal tuberculin test positive (0.3).

Diagnosis: Keratitis subepithelialis punctata and conjunctivitis (tuberculous).

Treatment: Tuberculin injections in 0.0005 mg. dose begun Aug. 2, 1929, continued once a week to Jan. 17, 1930, and concluded with dose of 0.05 mg.

Discharge note: R.V. 1.5. L.V. 1.5. Gain of fifteen pounds in weight. Had no attacks after the tuberculin injections were started, and was able to work every day.

Case 16 (illustration no. 6): Miss J.T. Age 28 years. Ht. 5′ 6″. Wt. 130 lbs. Came June, 1929.

Complaint: Poor vision.

Past history: Negative, except dieting to keep weight at 130 pounds.

Present illness: Vision in left eye became blurred six months ago, one week following an attack of influenza. Pain was severe in the left temple and supraorbital region, and continued.

Examination: R.V. 0.6. L.V. 0.8—2. General examination negative. Complement fixation test for tuberculosis 4 plus. Fields showed left homonymous hemianopsia with sparing of macular fibers. Left central relative scotoma for green, blue, and red (0.5°). Wernicke pupillary reaction elicited several times one day. Intradermal tuberculin test positive (0.1 mg.).

Diagnosis: Tuberculous process affecting the optic tract between the chiasm and the primary centers.

Treatment: Tuberculin injections begun immediately on her return to Texas. Report from Dr. Applewhite of

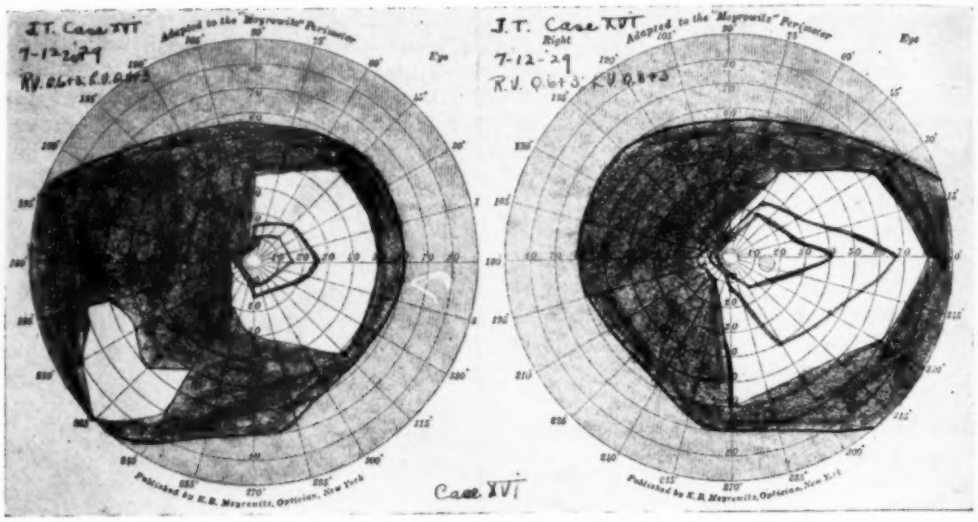


Fig. 6 (Suker and Cushman). Visual fields in case 16.

San Antonio Oct. 26, 1929, stated that her general condition had markedly improved. R.V. 1.0. L.V. 1.0. Fields the same, though central fields had cleared up.

We are interested in presenting this case with this group as it is so similar to a case reported by Gamble and Gamble before the section on ophthalmology of the American Medical Association in 1925. Their patient had fields which indicated a chiasmal lesion, and he recovered on tuberculin treatment after various other treatments and also after one relapse, which came after he stopped the treatment. With a decrease in the vision he returned for treatment and carried on until he was discharged. On inquiry recently, Dr. Gamble reported that this man had had no recurrences to date and had remained in good condition.

Summary

To conclude we believe that

(1) chronic inflammatory conditions of the eyes are often tuberculous.

(2) selected cases may be treated with tuberculin.

(3) general therapy is just as important as specific therapy, and fundamentally improper nourishment may be the basic factor in the development of a tuberculous infection as well as proper nouishment the great factor in its cure.

25 East Washington street.

References

Blair, W. W. Phlyctenular keratoconjunctivitis. Trans. Amer. Acad. Ophth. and Otolaryng., 1924, p. 195.

Derby, G. S., and Carvill, M. Anterior ocular tuberculosis. Trans. Amer. Ophth. Soc., 1927, v. 25, p. 523.

Dodd, O. W., and Lane, F. Tuberculosis of the eye following injury. Jour. Amer. Med. Assoc., 1911, v. 47, p. 274.

Finnoff, W. C. Ocular tuberculosis experimental and clinical. Arch. of Ophth., 1924, v. 53, p. 130.

Finnoff, W. C. A report of the changes found in the eyes following the injection of living bacilli into the common carotid artery. Trans. Amer. Ophth. Soc., 1923, v. 21, p. 87.

Ginsburg, Sigmund. Tuberculosis der Uvea. Handbuch der speziellen pathologischen Anatomie und Histologie, p. 452.

Gamble, W. E. and R. E. Tuberculosis affecting the optic chiasm. Trans. Sec. on Ophth., Amer. Med. Assoc., 1925, p. 102.
Head, G. D. A clinical study upon the exhaustion type of hidden tuberculous infections. A. Blakiston's Sons and Co., Philadelphia, 1924.
Hill, Emory. Tuberculosis in relation to the eye. Southern Med. Jour., 1928, p. 607.
Hammon, Louis. Medical aspects of ocular tuberculosis. Amer. Jour. Ophth., 1927, Feb., p. 127.
Junius, Paul. Das Tuberkulom der Conjunctiva bulbi. Arch. f. Augenh., 1929, p. 164.
Jackson, Edward. A present understanding of tuberculosis. Jour. Indiana State Med. Assoc., 1924, v. 17, Dec., p. 403.
Krause, A. K. Factors in pathogenesis of tuberculosis. Amer. Rev. Tuber., 1928, v. 18, pp. 208-248.
Krause, A. K. The nature of resistance to tuberculosis. Amer. Rev. Tuber., 1917, v. 2, p. 65.
Löwenstein, E. Handbuch der gesamten Tuberkulose-therapie, Vienna and Berlin, Urban and Schwarzenberg, 1925.
Luedde, W. H. The significance of the tuberculin reaction and other problems in ocular tuberculosis. Amer. Jour. Ophth., 1923, v. 6, Mar., p. 161.
Meller, J. Welche Bedeutung hat die Tuberkulose für die Iridocyclitis. Wien. klin. Woch., 1926, March 18.
Pirquet, C. Klinische Studien über Vakzination und vakzinale Allergie, Leipzig and Vienna, Franz Deuticke, 1907.
Pottenger, F. M. Allergy in clinical tuberculosis. Tubercle, 1929, v. 10, June, pp. 409-431.
Pottenger, F. M. What is clinical tuberculosis? Amer. Rev. Tuber., 1928, v. 18, pp. 570-579.
Pottenger, F. M. Rational basis of tuberculosis therapy. Brit. Med. Jour., 1927, July 9, p. 55.
Pottenger, F. M. The allergic reaction, the basis of tuberculin therapy. Amer. Jour. Int. Med., 1927, v. 1, p. 283.
Urbanek, Josef. Die Bedeutung der Tuberkulose für die entzündlichen Erkrankungen des Uvealtractus. (Beihefte z. Zeit. f. Augenh.) Abhandl. a. d. Augenh. u. i. Grenzgeb., 1929, pt. 12.
Von Ruck, Karl. Tuberculosis problems, Therapeutic Gazette, 1922, v. 38, March and April, p. 240.

BILATERAL COLOBOMA OF THE OPTIC DISC AND CHOROID, WITH COLOBOMA OF THE RIGHT IRIS

JUANITA P. JOHNS, M.D.
BOSTON

In the right eye there was a coloboma of the iris downward, with a small cleft in the lens margin; and the ophthalmoscope disclosed a coloboma of the optic disc and choroid. In the left eye the iris was normal, but there was a choroidal coloboma only. Defect of vision was more marked in the right eye, and there was a horizontal nystagmus.

Our embryological studies have revealed to us that congenital intraocular coloboma is caused by failure of the choroidal fissure to fuse normally. If the closure is complete except for a small defect at the margin of the cup, there results a coloboma of the iris. If, however, the deeper structures of the fetal cleft are arrested in their fusion, coloboma of the choroid and retina results[1]. .

Coloboma occurs in many structures of the eye. Colobomata have been described and reported involving the eyelid, the iris, the lens, the ciliary body, the retina, the choroid, the macula, and the disc. One structure only of the eye may have a coloboma or several may be involved. It may be a unilateral condition or both eyes may show coloboma, in varying degrees, and typical or atypical in form. Choroidal coloboma

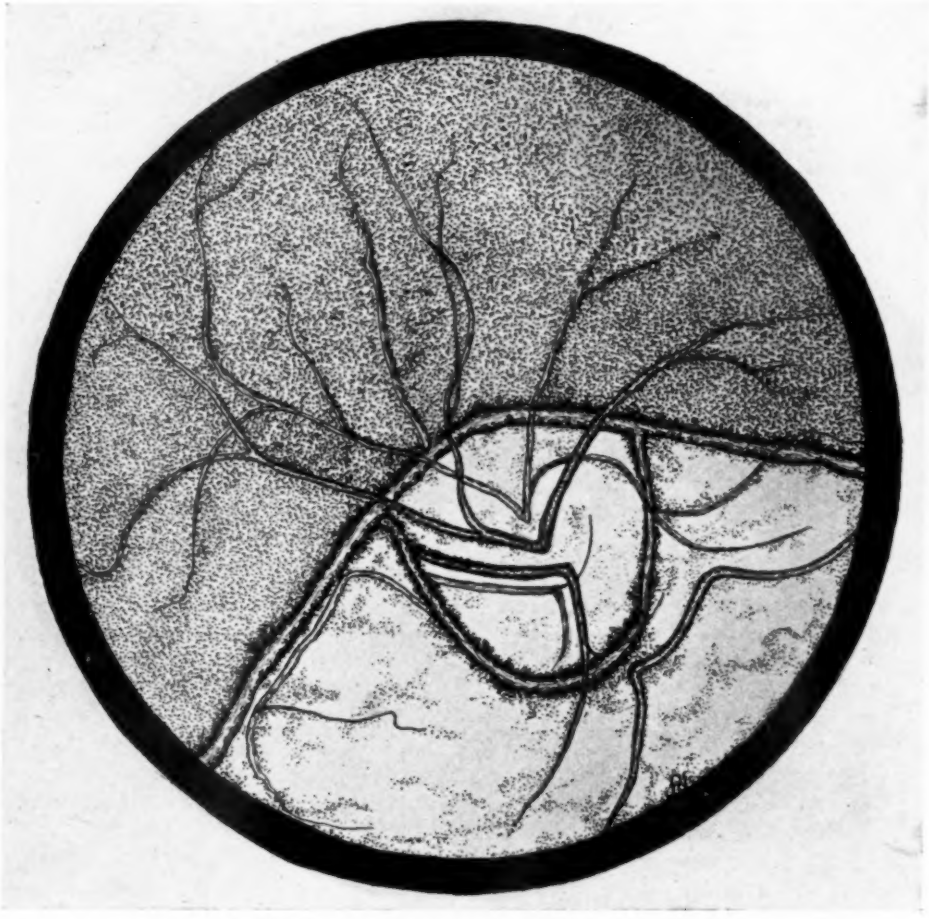


Fig. 1 (Johns). Right fundus.

is not extremely unusual, but coloboma of the disc is regarded as a very rare anomaly.

Several factors have been presented as influencing the arrested development of the tissues. Calhoun[2], in reporting his case of bilateral coloboma of the optic nerve, cites the influence that an abnormal amount of mesoblast might exert if persisting within the fetal cleft and resulting in failure of the fissure to fuse and consequent atypical distribution of the vessels within the nerves. He refers to pressure as a factor in his case, and also to disturbed nutrition. He refers to Stockard's series of experiments on vertebrates and mammals, in which Stockard demonstrated that chemical and thermal interference at the strategic periods of cell differentiation in early development resulted in permanent imperfections of the eye. By reducing the oxygen supply he produced a deficiency in general developmental energy.

Swanzy[3], after referring to the work of Treacher Collins, who has pointed out that coloboma, partial defect, and aniridia are manifestations of the same condition in different degrees, says:

"If we suppose some abnormal adhesion to occur between the cornea, anterior fibrovascular sheath, and lens capsule, or some delay in their separation at the whole circumference of the future anterior chamber, we can understand how a mechanical obstruction to any growth of the iris forwards would

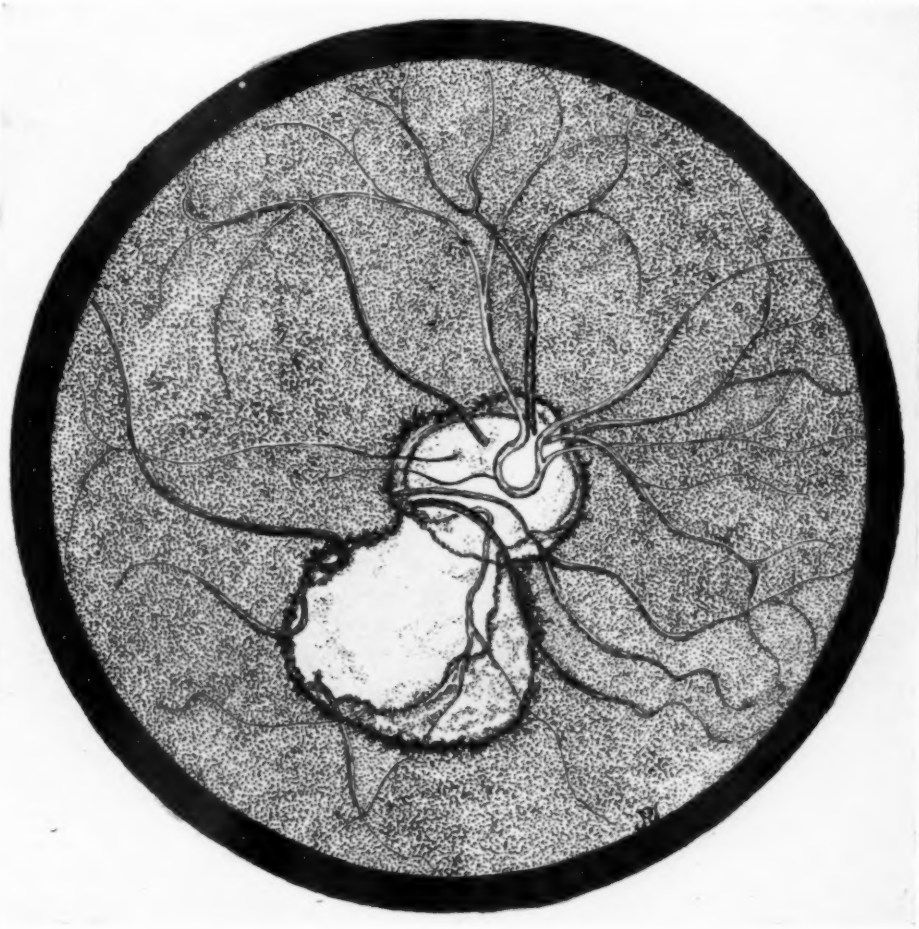


Fig. 2 (Johns). Left fundus.

be introduced, resulting in complete absence of the iris, or irideremia. Irideremia may be complete or partial. In the latter case it may be the inner circle only which is wanting, giving the pupil the appearance of dilatation with atropin. Where the entire iris is absent, the ciliary processes can be seen all around. The condition may be bilateral. If the obstruction

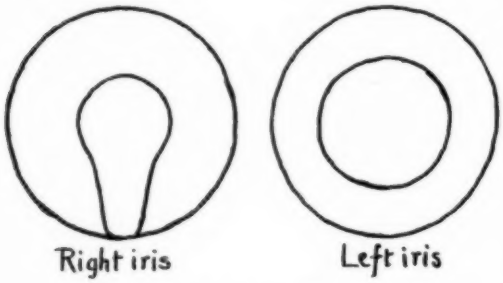


Fig. 3 (Johns). Diagram of pupils.

be confined to a portion only of the anterior chamber, the corresponding portion only of the iris will be prevented from growing forwards and the result will be one or more congenital colobomata".

Case report

L. L., a schoolboy, aged sixteen years, was brought for examination on October 16, 1928.

The family history was essentially negative. The personal history included the usual childhood diseases with uneventful recovery. The general health of the patient was good. He described having had poor vision as long as he could remember. For the past three years, he had been having frontal headaches and constant dull aching through the eyes. For several months, acute dizziness occurred upon use of the eyes at close range. Photophobia was described, and moving pictures had been given up because the eyes were painful afterward and it was difficult to keep them open.

The examination disclosed a constant horizontal nystagmus which increased on fixation. The irides were pale in color, with areas that appeared thinner. Irregular discreet pigment splotches were scattered through the iris stroma, presenting the appearance of a piebald iris. The right pupil was pear-shaped, a coloboma appearing at the six o'clock position. The left pupil was round and normal in position.

The right lens showed a small cleft in the lower central portion of the outer margin. This could be seen only when the pupil was dilated.

In the right fundus, with the ophthalmoscope, one could clearly trace a coloboma of the disc and choroid. The coloboma of the choroid was extensive, merging into the disc. It was placed characteristically in the lower central region and extended as far out into the periphery as could be seen. The area was depressed and irregular, pearl-colored, smooth and shiny in appearance. An irregular deposition of pigment indented the edge, and fine pigment particles were stippled irregularly through the field of the coloboma. In the lower fundus the vessels were chaotic in their formation and distribution. The superior vessels were more typical, though they departed to some extent from the normal.

The left eye was also colobomatous, though involved to a lesser degree. The coloboma was in the lower center part of the fundus. It appeared at first as though here only the disc was involved. Close study, however, revealed the fact that a small area of the choroid was included. The vessels of the upper left fundus described a horseshoe curve in the center of the disc. The branches were numerous and irregular. The superior arterial distribution was cilioretinal in character. The inferior vessels were disorganized. Three of these curved up on to the normal fundus level from a deeper level of the coloboma with an appearance very like that of vessels in a glaucomatous eye.

The visual acuity of the right eye in the precycloplegic examination was 5/200, that of the left was 20/70. Atropin two percent was used for cycloplegia in the usual manner and the visual acuity of the right eye showed 10/100 and that of the left eye 20/70. The postcycloplegic examination dem-

onstrated the visual acuity for the right eye as 10/200 and that of the left eye as 20/70. The error of refraction proved to be one of compound myopic astigmatism nearly alike in the two eyes, and of a fairly low degree. There was a right hyperphoria of five degrees. With correction of the error of refraction, including four degrees of prism for the hyperphoria, the visual acuity of the right eye was 20/80—2 and that of the left eye 20/30. The near vision with correction was O.D. Jaeger 2 and O.S. Jaeger 1.

Visual fields were taken on the Peter campimeter and scotomata corresponding to the colobomatous areas were outlined.

Reexamination of the patient in September, 1929, showed the visual acuity of the right eye to be, with correction, 20/30—2 and Jaeger 2, and that of the left eye 20/20 and Jaeger 1. No change of correction was indicated at this time.

The patient had left school and had taken up farming. All pain and discomfort were gone. He had grown and had gained twelve pounds. The nystagmus appeared to be less rapid and did not increase on fixation. He reported freedom from pain from the time he had put on his correction.

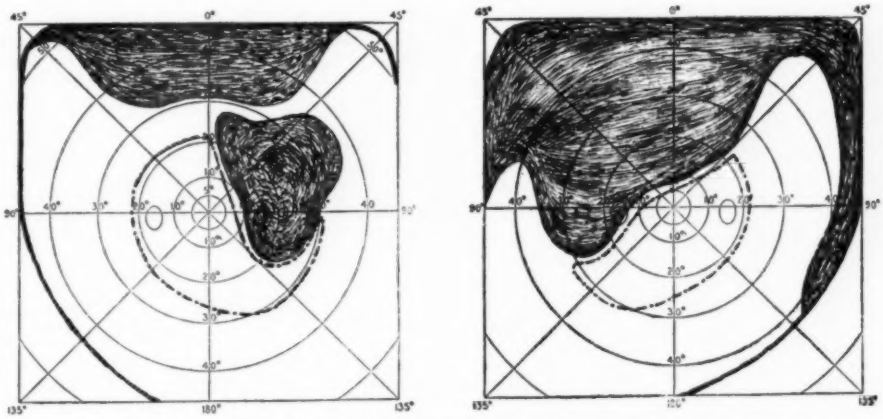


Fig. 4 (Johns). Visual fields; those for form and colors being taken in bright light, at 16.5 centimeters, with a two-degree object; and the blind spots in daylight at the same distance with a one-degree object. Absolute scotomata. Enlarged blind spot O. D. Partial color fields.

Comment

The colobomata of this case are characteristic. The primary interest lies in the coloboma of the right iris. De Schweinitz[4] points out that, where there is a unilateral coloboma of the iris, it is found more frequently in the left eye.

The literature on the subject of coloboma shows a variety of illustrations of coloboma of the choroid and various degrees of colobomatous involvement of the disc, with atypical and typical formation of vessels. This case demonstrates a definitely atypical vessel formation and distribution in the lower fundus. In harmony with the considerations that Calhoun[2] presents, it would appear that closure of the fissure was interfered with along the stalks of both eyes.

419 Boylston street.

References

[1] Lewis and Stohr. A textbook on histology, 1913, pp. 439-465.
[2] Calhoun. Bilateral coloboma of optic nerve. Arch. of Ophth., 1930, v. 3, Jan., pp. 71-79.
[3] Swanzy's handbook of the diseases of the eye, 1925, p. 228.
[4] De Schweinitz. Diseases of the eye, 1921, p. 325.

HERPES ZOSTER OPHTHALMICUS

An unusual case

LYLE S. POWELL, M.D.
LAWRENCE, KANSAS

The author's exceptional case developed complete right facial paralysis. This improved after removal of two dead molar teeth. But the patient was not able to return to work until seven months after onset of the disease, and then he continued to present a residual facial palsy, and anesthesia of the affected cornea and skin, with tingling of the corresponding side of the tongue and throat.

Herpes zoster ophthalmicus, because of its obscure etiology, its severe course, and its many complications, presents an interesting problem. It is an affection of the skin accompanied by the formation of vesicles along the terminal expansions of the trigeminal nerve. Although occurring comparatively rarely in ophthalmic practice, it has been my privilege to observe three of these cases during the past year. One of these was so unusual as to warrant recording.

According to Fuchs[1], "violent neuralgic pains in the course of the trigeminus usually precede for some days the outbreak of the herpes. Then the exanthem makes its appearance with accompanying febrile symptoms, vesicles, which for the most part are arranged in groups, starting up upon the reddened skin. The vesicles most frequently occupy the region of distribution of the first branch of the nerve, so that they are found upon the upper lid, upon the forehead as far as the scalp, and also upon the nose. When the district supplied by the second branch of the trigeminus is affected, the vesicles are situated upon the lower lid, over the superior maxillary region as far down as the upper lip, and over the region of the malar bone. Sometimes the terminal expansions of both branches are affected simultaneously, while it is extremely rare for the region of the third branch to be involved. It is a characteristic feature of the exanthem, which is almost always confined to one side, that the affection of the skin is sharply delimited to the middle line. At first the vesicles contain a limpid fluid, which soon becomes cloudy and purulent and finally dries up into a crust. If this is removed, an ulcer is found beneath it, a proof that the suppuration has penetrated into the corium. After the ulcer heals, cicatrices remain which are visible during the whole life and by their characteristic arrangement render it possible to diagnosticate the previous existence of herpes zoster even years afterward".

Fuchs quotes Hutchinson[2] as stating that the eye is implicated only in those cases of herpes zoster ophthalmicus in which the nasociliary branch is involved.

Lewis[3] calls attention to the fact that the eruption may not be delimited sharply at the midline because of overlapping of the nerve filaments from opposite sides, and because the distribution of the ophthalmic division of the fifth nerve is often different on the opposite sides. The nasal branches may be absent altogether.

When the eye is involved, the usual picture is the development of herpetic vesicles on the surface of the cornea, from which develop large ulcers often eventuating in the destruction of the eye. In rarer cases, such as the one reported herewith, deep infiltrates form which do not undergo purulent disintegration, presenting a true keratitis profunda. Iritis, iridocyclitis, panophthalmitis, and various involvements of the ocular muscles may occur. The eye complications begin only after the skin eruption has reached its height or is subsiding. There is a close pathological resemblance between the inflammation of the posterior ganglionic chain in herpes zoster and that of the anterior horn of the spinal cord in acute anterior poliomyelitis. This led to the designation of specific herpetic inflam-

mation as acute "poliomyelitis posterior", which was adopted by Hunt[4] in his publications. Recent contributions on the subject seem to be surprisingly rare.

Etiology

The cause of such inflammation is not definitely known. Some cases are, as experiments seem to show, due to a specific organism (Verhoeff[5]). Others are probably due to different causes. Fuchs[1] states that herpes may be caused by chilling of the body, head injuries, the use of arsenic, and carbon monoxide poisoning. I personally have seen one case precipitated by the use of arsenic. Syphilis possibly predisposes, as may also other systemic diseases. It has been frequently observed in cases of upper respiratory infection, such as influenza. It sometimes follows trauma, both accidental and operative.

The typical cases are probably due to the specific organism, which is a filterable virus closely akin to that causing chicken pox. It has, indeed, been noted that herpes zoster rarely affects individuals who have had chicken pox. Teague, Goodpasture, and Lipschutz[6] produced in animals, by inoculation with the virus of herpes simplex, a disease identical with human herpes zoster. They believe that herpes zoster is due to a virus "differing from the virus of herpes simplex only in virulence". Similar experiments have been carried out by Flexner[7] in cases of encephalitis producing vesicular keratitis and dermatitis in the rabbit. These experiments would seem to indicate that the infectious agents of encephalitis, herpes simplex, and herpes zoster are closely allied. Hunt's observation that the spinal fluid shows a marked increase of lymphocytes in cases of herpes zoster would seem to be of considerable diagnostic significance in obscure cases, especially those with provisional diagnosis of localized encephalitis and the so-called rheumatic affections of the cranial nerves without herpes. Also, cases of paralysis of the face, soft palate, tongue, or even larynx may very likely belong to this acute posterior poliomyelitis group.

Pathology

The pathology of this condition was ably described by Head and Campbell[8] in 1900. It consists of acute inflammation with hemorrhage in the gasserian ganglion, later changing into fibrous tissue with degeneration of the nerve fibers and thickening of the overlying sheath. Hesser's[9] report on the microscopic section of a case of herpes of the chest is most interesting.

"A careful examination of the spinal ganglia showed that they were greatly altered. The ganglionic cells and intraganglionic tissue could be recognized but the nuclei of the cells were generally colorless. The tissues were studded with circumscribed or diffuse hemorrhagic areas, especially at the periphery of the ganglion. These areas were less numerous at the central portion. . . . . The deep surface of the ganglion was necrotic. In its superficial portion there was a layer of lymphocytic or polynuclear cells".

Under high power "it was seen that each area was formed of a mass of red cells so arranged that the ganglionic cells were surrounded by them. . . . . At certain points the protoplasm was homogeneous, but most frequently it was granular or provided with an extremely fine reticulum. Several cells showed a great abundance of pigment. Most of the cells did not have a stained nucleus. In a few cells the nucleus was normal. It was interesting to follow these alterations in centripetal or centrifugal directions. The peripheral fibers, both before and after union with the motor fibers, showed many hemorrhages which followed the course of the nerve in its two branches. The capsule of the ganglion was infiltrated with cells, and the neurilemma was occupied by a compact layer of tissue presenting a marked cellular infiltration. The interior of the nerve was equally infiltrated with cells. This hemorrhagic neuritis could be followed toward the periphery for about 1½ cm". While Hesser's patient was af-

flicted with acute zona at the time of his death, it should be stated that he was also syphilitic. However, only the ganglia supplying the area involved with the zona showed these pathological changes. Herpes zoster is a severe, prostrating disease attended with extreme and constant pain leading in many cases to marked systemic and metabolic disturbances. Locally, it presents many and varied complications. Metz[10] and others have reported total ophthalmoplegia, while Barrett and Orr[11], Ginsberg[12], and others have seen diplopia. Fuchs[1] mentions two cases with facial paralysis, to which I add another. Corneal involvement, often proceeding to destruction of the eye, is frequent, especially when the nasociliary branches are involved. Ptosis and anesthesia of the cornea are often residual, as are also paralysis of accommodation and mydriasis. It is a disease affecting most frequently those in the fourth and fifth decades, although any age may be affected. Knox[13] reports a case in an infant of fifteen months, and Jeffries[14] reports a fatal case in a patient eighty years of age.

Treatment

Treatment is largely symptomatic. Dusting powder of rice or boric acid on the skin vesicles is indicated. The eye should be atropinized. The mental attitude of the patient must receive careful consideration. Morphine may be necessary for pain. A nourishing diet should be prescribed and enforced. Friedenwald[15] has recently reported favorable results with intramuscular injections of convalescent serum.

The following case is presented because of the prostration and metabolic interference, the unusual corneal involvement, the residual facial palsy and the tongue and throat symptoms, exhibiting involvement of the fifth, seventh, ninth, and tenth cranial nerves.

Mr. A. H. G., aged forty years, an automobile mechanic, consulted me on February 22, 1929, complaining of severe frontal headache, particularly on the right side, which had persisted for about forty-eight hours. The personal history contained nothing pertinent to the case. On examination, moderate diffuse tenderness was apparent over the right frontal area. The right eye was quite red, both the bulbar and the palpebral conjunctiva being involved. The tension of both eyes was within normal limits. There was no deep ciliary injection. The cornea, uveal tract, media and fundus appeared entirely normal. The vision was 20/20 without any correcting glass. The corneal reflex was distinctly reduced in the right eye. In fact, anesthesia was so complete that it was difficult to induce winking by touching the right cornea with cotton fiber. The left eye was entirely normal, the vision 20/20. The pupils were equal and regular and reacted to light and accommodation.

The nose was entirely normal, as was also the mouth and throat with the exception of two upper right molars, which were suspicious in appearance but not tender. Two months previously the patient had visited a competent dentist who had pronounced his teeth and gums in healthy condition. The ears were normal in appearance and in response to all forks. Caloric and turning tests were not made. There was no nystagmus.

The patient gave no history of a recent upper respiratory infection, or, in fact, of any recent illness. He had had no severe illness of any sort and could not remember having ever previously consulted a physician during his adult life.

By the next day, February 23, 1929, there was beginning typical herpetic eruption over the right frontal area, extending just a little beyond the midline of the forehead and as high as the parietal bone. It extended down over the right temporal area as far as the level of the outer canthus, and included the upper and lower eyelids, the right inner canthus, and the right side of the nose down to and including the tip. The pain was terrific and was only moderately abated by the liberal use of morphine. There were no blebs or lesions of any kind on the cornea at this

time. The interior of the eye was entirely normal.

By February 26 the vesicles had begun to dry up somewhat under massive crusts. The right eye was atropinized from the first. The patient was seen at least once each day, but no corneal involvement appeared until March 4, 1929, at which time the posterior surface of the cornea was seen to be covered with very fine, distinctly separated opaque beads over the entire pupillary area. The anterior surface of the cornea was perfectly smooth, and at no time was there any staining with fluorescein or mercurochrome. The tension was normal.

During the next few days these beads appeared to unite, forming fewer and larger beads, involving however the same area. The pain continued severe and marked deep ciliary injection and tenderness appeared at the same time as the corneal involvement.

On March 18, three and one-half weeks from the onset, the patient exhibited a complete right facial paralysis, including the loss of taste, of the entire right side of the tongue; and he was considerably annoyed by a continual tingling sensation of the right side of the tongue and throat as low as the thyroid cartilage. The voice was markedly changed, being weak and hoarse. The right vocal cord was noticeably less responsive on phonation, although it did not remain in the cadaveric position. There was partial anesthesia of the right side of the palate and pharynx. The soft palate was in the midline. Both ears were normal in appearance and to all fork tests.

The neuralgic pain continued but gradually became more moderate. On March 20 the patient was again examined by his dentist, and two upper right dead molars were extracted. Immediately the facial paralysis improved markedly. In twenty-four hours the patient was able to whistle in one corner of his mouth. The tingling of the throat and tongue continued but with less intensity. The vision was 20/100 in the right eye and 20/20 in the left. A low-grade uveitis continued and the exudate on Descemet's membrane had become a rather opaque film, covering the entire pupillary area.

On March 20 the patient was put on graduated doses of potassium iodide. The facial palsy continued but appeared to be improving. The right eye was kept atropinized and on April 10 dionin and hot compresses were prescribed. The vision in the right eye at this time had improved to 20/50 with a plus 1.50 sphere. The low-grade uveitis continued, with deep ciliary injection and tenderness. The eye was kept atropinized until May 13. By this time practically all tenderness and injection had disappeared. The vision remained 20/50 corrected, and the corneal opacity seemed stationary. Intermittent courses of dionin were continued. There was marked residual facial palsy. The patient was not able to resume regular work until August, nearly seven months after the onset of the disease. The constant pain and discomfort had reduced him to a shadow of his former self. He is still kept under observation and was seen one week ago, December 10, 1929. There remain the usual pocklike marks in the skin, the impaired visual acuity due to the old descemetitis, and the residual facial palsy. The right cornea is markedly anesthetic, as is also the skin over the area involved. There is still some tingling of the right side of the tongue and throat. The voice and the excursions of vocal cords seem entirely normal.

Summary

A case of herpes zoster ophthalmicus with typical skin lesions over the right forehead, eyelids, and right side of nose, with unusually deep corneal involvement; presenting also involvement of the seventh nerve as indicated by the facial paralysis, of the ninth nerve as indicated by loss of taste on the posterior third of the tongue, and of the tenth nerve as indicated by partial anesthesia of the palate and pharynx, weakened response of the right vocal cord on phonation, and weak, hoarse voice.

813 Massachusetts street.

References

[1] Fuchs. Textbook of ophthalmology. 6th ed., J. B. Lippincott Co., pp. 657-659.
[2] Hutchinson. Cited by Fuchs (see reference no. 1).
[3] Lewis, J. B. Herpes ophthalmicus. Med. Jour. Australia, 1927, v. 1, Jan., p. 124.
[4] Hunt, J. R. Herpetic inflammation of the geniculate ganglion. Jour. Nerv. and Ment. Dis., 1907, v. 34, p. 73. Paralytic complications of herpes zoster of the cephalic extremity. Jour. Amer. Med. Assoc., 1909, v. 53, p. 1456. The symptom complex of acute posterior poliomyelitis of the geniculate, auditory, glossopharyngeal, and pneumogastric ganglia. Arch. Int. Med., 1910, v. 5, June, p. 631.
[5] Verhoeff, F. H. Personal communication, 1929, June.
[6] Teague, Goodpasture, and Lipschutz. Cited in editorial, Jour. Amer. Med. Assoc., 1924, v. 82, p. 1049.
[7] Flexner. Experimental epidemic encephalitis and experimental herpes. Trans. Assoc. Amer. Phys., 1923, v. 38, p. 201.
[8] Head and Campbell. Pathology of herpes zoster. Brain, 1900, v. 23, p. 353.
[9] Hesser. Anatomical lesions in a case of zona. Acta Med. Scandinav., 1924, v. 60, p. 278.
[10] Metz, R. B. Herpes zoster ophthalmicus complicated by ophthalmoplegia. Ohio State Med. Jour., 1913, v. 9, pp. 590-593.
[11] Barrett, J. W., and Orr, W. F. Diplopia following herpes zoster ophthalmicus. Intercolonial Med. Jour., 1902, v. 7, July, pp. 330-334.
[12] Ginsberg. Cited by R. B. Metz (see reference no. 10).
[13] Knox, R. A. Herpes zoster ophthalmicus in an infant of fifteen months. Atlantic Med. Jour., 1928, v. 31, July, pp. 750-751.
[14] Jeffries, B. J. A case of herpes zoster ophthalmicus in a patient nearly eighty years of age, causing fatal prostration. Trans. Amer. Ophth. Soc., 1868, v. 4, p. 75.
[15] Friedenwald, J. S. Report of a case of herpes zoster ophthalmicus treated with convalescent serum. Johns Hopkins Hosp. Bull., 1929, v. 45., Aug., pp. 103-104.

OCULAR MYIASIS

C. P. SCHENCK, M.D., F.A.C.S.
FORT WORTH, TEXAS

A workman felt a foreign body strike the eye. Six or eight hours later twenty-five larvæ were removed from the conjunctival sac. Two of the larvæ had penetrated beneath the bulbar conjunctiva, and were removed by picking up and excising a fold of conjunctiva containing each larva. They were thought to be larvæ of the Oestrus ovis or sheep-bot. Read before the Texas Ophthalmological and Otolaryngological Society, December 14, 1929.

Myiasis is described as a disease due to the presence of fly larvæ in or on the body. The word "flies" is here used as a generic term having reference to dipterous or two-winged insects. There are about 90,000 European and about 4,000 American species already recognized[1]. The house fly is the best known representative, but commonly known forms are gnats, mosquitoes, gad-flies, bot-flies, blow-flies, tzetzes, and so forth.

Diptera are mostly diurnal, preferring warm sunshine, but a notable exception is the mosquito. This insect and some others, such as tzetzes, are serious pests to men and animals, because of annoyance and the carrying and communicating of disease germs, such as malaria, yellow fever, sleeping sickness, typhoid fever, tuberculosis, and the like.

Myiasis is most common in tropical or subtropical countries, but occasional reports come from more northern climes, such as one reported from Saskatchewan. The maggots or larvæ of diptera are usually legless worms that feed on decaying matter. It is not uncommon to find them in sores on cattle, sheep, and horses, and in some instances these sores are called "warbles". A well recognized and effective treatment is the local use of chloroform. Their occurrence in nasty sores on the human animal has been often recorded. Many rhinologists have had the loathsome experience of removing these maggots, sometimes to the number of hundreds, from the nose of a patient with ozena. Sleeping in the open air or lying out in a drunken stupor has allowed infestation to occur in a number of recorded cases.

The life history of Chrysomyia macellaria, whose larvæ are called "screw-worms", is interesting. Living larvæ are sometimes deposited, or eggs which hatch in from one to nine hours. The larvæ attain a size of one-fourth by one inch in three or four days. They live in the host about a week, then spend from nine to fourteen days in the ground, after which the mature fly emerges.

Stroud[2], in general practice in the Southwest, reports having had sixteen patients with "screw-worm" infestation in thirteen years. In twelve cases the nose was infected, but in no instance was the eye involved.

Elliot[3] has noted the frequent occurrence of "worms" in the anterior or posterior chamber of horses in India, and a crude operation is sometimes done to remove them.

Compared with the great number of nasal and other infections with maggots, the relatively infrequent occurrence of ocular infestation seems remarkable. In eight ophthalmic textbooks I have found no reference to ocular myiasis. It is merely mentioned in two others. Fuchs[4] gives Leber as authority for the very rare occurrence of larvæ of diptera in the retina. De Schweinitz[5], dealing with the subject in a single sentence, says that conjunctivitis has been described as due to the presence of larvæ in the conjunctival sac. In a rather extensive search I have found less than twenty titles of articles dealing with this subject in the literature, other than twenty-odd cases briefly abstracted in the American Encyclopedia of Ophthalmology. The oldest recorded case was that of Salzmann[6], who in 1718 reported a case in which a child's eyes had been completely destroyed by maggots. This

was followed by a case described in 1777 by Wohlfahrt[7], in which eighteen large maggots came from the orbit and surrounding tissues, where they had done much damage. In 1853 Grube and Schnee[8] reported two cases in which the destruction of orbital tissues was so great as to expose the eye muscles. Larvæ have been found in the lids, caruncle, conjunctival sac, lacrimal sac, anterior and posterior chambers, or deep in the orbit. In fact, more than one case has been reported in which the entire contents of the orbit have been consumed and the orbit found packed with maggots. Deaths are not infrequent from nasal invasion, and some deaths have been recorded from orbital infection, due to the ability of the larvæ to consume the tissues and burrow extensively. However, some types are content to remain upon the surface, and their damage is largely limited to irritation of the tissues, such as the conjunctiva and cornea.

There may be various routes of entry to the eye. The insect may deposit its eggs in the conjunctival sac. Indeed, some of these insects are viviparous, and deposit the living larvæ on the conjunctiva, where they at once begin moving about. Again, the eggs or living larvæ may be deposited in the nose, and gain access to the conjunctival sac through the lacrimal passages or by burrowing through the tissues. They may pass into the eyeball through the central artery of the retina or a ciliary artery, or may burrow into the eyeball from the conjunctival sac.

Stark[9], in 1923, reported an interesting case of sheep-bot larvæ in the eye. He says: "I would hesitate to report a single case, did it not seem to have an exclusive place in American literature, evidenced by the fact that I have found none like it so far recorded". He states further that the larvæ of Oestrus ovis or sheep-bot are deposited by the fly while in motion in the nostrils of the sheep. They remain in the sinuses during the winter, where they undergo development, and in the spring they are expelled and develop into flies. Stark quotes from Portchansky, a Russian, who describes the larvæ as reaching 1 mm. in length, and as having an elongated oval body, broad in front and gradually attenuated in the rear. The mouth hooks are dark colored, well developed, resemble horns, and serve for attachment to the mucous membrane. Stark concludes that sheep-bot myiasis seems to be uncommon in any country, and occurs where people are much more numerous than sheep. He says that most recorded cases are from northern Africa and southern Europe, and thinks it doubtful whether any permanent damage is done to the eye by sheep-bot larvæ.

Case report

In May, 1928, a mechanic, while at work, felt a foreign body strike the eye. As wiping did not relieve him, his physician inspected the eye, but could find nothing. Six or eight hours later I found and removed twenty-five larvæ from the conjunctival sac. Eversion of the lower lid revealed what looked like a minute black dumb-bell progressing with relative rapidity in short jerky movements. More careful focusing with oblique illumination and binocular loupe revealed this to be in the anterior end of an almost transparent body with about eight segments, which adhered with remarkable tenacity to the conjunctiva. When removed this proved to be a larva or maggot. One after another was found in the folds of the inferior cul-de-sac. A curved toothless iris forceps proved much more successful than the cotton-tipped applicator in removing them.

Two larvæ were found to have worked their way beneath the bulbar conjunctiva, where they continued their movements. It was thought desirable to avoid an incision for their removal, as the slightest hemorrhage would have concealed their whereabouts. After some consideration, the following procedure was instituted. The curved iris forceps, with blades separated, was laid with convex side against the conjunctiva, and a mass of the latter, including the larva, was picked up and drawn away from the sclera. The

conjunctiva and included larva were then touched with the red-hot electrocautery point, which destroyed both conjunctiva and parasite. It was evident that all larvæ were removed, as the patient reported later that his recovery was immediate.

As removed the larvæ were dropped into a convenient antiseptic solution. It is to be regretted that no effort was made to mature the larvæ to the stage where they would pupate, so that identification of the adult insect might have been accomplished. In the experience of others, however, such an effort has rarely been successful. From the description given in Stark's paper, it is believed that these were larvæ of the Oestrus ovis or sheep-bot. The larvæ measured one millimeter or less in length, exhibited about eight segments, and had dark hooks or bristle-like processes along the head and sides.

1011-12 Medical Arts building.

References

[1] American Encyclopedia of Ophthalmology, v. 6, p. 4016.
[2] Stroud, R. J. Myiasis in the Southwest, with particular reference to the species Chrysomyia macellaria. Southwest Medicine, 1927, July, p. 313.
[3] American Encyclopedia of Ophthalmology, v. 12, p. 9346.
[4] Fuchs, Ernst. Text-book of Ophthalmology, 7th ed. in English, p. 751.
[5] de Schweinitz, G. E. Diseases of the eye, 9th ed., p. 244.
[6] American Encyclopedia of Ophthalmology, v. 12, p. 9350.
[7] The same, p. 9350.
[8] The same, p. 9351.
[9] Stark, H. H. Ophthalmomyiasis externa, due to larvæ of Oestrus ovis, Jour. Amer. Med. Assoc., 1923, v. 81, Nov. 17, p. 1684.

TRANSIENT HYPEROPIA IN DIABETES

T. H. Odeneal, M.D., F.A.C.S.
BEVERLY, MASSACHUSETTS

Two cases are described to illustrate the brief duration of these cases, and the fact that the patient should not be subjected to correspondingly frequent changes in the corrective glasses unless occupational conditions render such changes necessary.

Sudden changes in refraction should make one suspicious of diabetes. Likewise, frequent changes in refraction should excite suspicion and demand urinary examination. Diabetes is the only disease in which sudden transient hyperopia occurs, and its presence alone is diagnostic of the underlying disease.

Various theories have been advanced as to the cause of this transient hyperopia, but that of Duke-Elder has been accepted as the true one. His explanation is that when the blood sugar becomes low through treatment of the diabetes the osmotic pressure of the blood becomes high, causing the lens to give up water, and to become flatter than normal, thus inducing hyperopia. Vice versa, when the blood sugar becomes high during the height of the disease, the osmotic pressure of the blood becomes low through pouring of fluids from the tissues into the blood and loss of sodium chlorid in the urine, so that the fluid penetrates the lens, the consequent swelling of which produces myopia.

Since the advent of insulin, transient hyperopia has been more prevalent, because of the quicker results obtained. This temporary hyperopia disappears under continued treatment, and the patient should not be subjected to frequent change of glasses unless absolutely necessary. For instance, when a business man becomes incapacitated for near work, he must have the proper correction to continue his occupation, and cannot afford to wait until the lens returns to normal. It is better and more economical to prescribe the change in a fit-over spectacle that can be added to the more complicated and more expensive glasses that are worn constantly, usually bifocals. Transient hyperopia practically always occurs in those past middle life, when the refraction is subject to frequent change.

In 1925 Duke-Elder analyzed forty-five cases collected in the literature up to that time, cites three more of his own, and mentioned three cases in the experience of a colleague.

Gifford reports two cases of transitory hyperopia. He believes that the remarkable changes of refraction occurring in diabetes throw light on the pathogenesis of diabetic cataract. When the blood sugar is high, if enough fluid collects in the lens, permanent changes in the form of cataract develop.

Anderson of Copenhagen reports an incidence of 14.6 percent of transitory refractive errors in a total of 292 diabetics, with as much as seven to eight diopters of change in some cases.

Post reports one case in detail in support of Duke-Elder's findings; and Dykman cites four cases. Burch, Spalding and Curtis, Roberts, Joslin, and Larsen report in all thirteen cases.

Notwithstanding the number of cases reported this subject seems to be relatively unfamiliar, and it is likely that the true significance of such changes often escapes the refractionist.

My own cases are three in number, one of which I have been unable to refract thus far, from the fact that she is in the hospital. She complains of dimness of vision since beginning insulin treatment, and I have no doubt that this is due to a hyperopia induced by the high osmotic pressure of the blood causing the lens to give up some of its water and to become flatter.

Case 1: Banker, aged fifty-five years, has been under dietetic treatment for diabetes during the past thirty days. He noticed his vision was failing, and he did his office work with difficulty. Urine and blood were free from sugar. He had been refracted two weeks previously, with the following result: O.D. plus 2.00 D. cyl. axis 165°; O.S. plus

2.00 D. cyl. axis 15°; add plus 2.00 D. sph. O.U. Upon his return to me this had changed to O.D. plus 1.50 D. sph. plus 2.00 D. cyl. axis 165°; O.S. plus 2.00 D. sph. plus 2.00 cyl. axis 15°; add plus 2.00 D. sph. O.U. The above additional spheres were prescribed in fit-over spectacles. It was two months before this patient could discard the addition, the refraction having returned to the original correction.

Case 2: Teacher, aged fifty-six years, under treatment for diabetes. One month ago he noticed his vision growing worse and consulted an optician, who prescribed the following correction: O.D. minus 3.00 D. sph. minus 1.25 D. cyl. axis 165°; O.S. minus 2.50 D. sph. minus 1.00 D. cyl. axis 180°; add plus 2.00 D. sph. O.U. This correction gave relief for a time, but vision began to blur again and he decided to consult his family physician, who discovered he had diabetes and put him on a strict diet. Soon he could not see at all with the glasses prescribed by the optician, and was referred to me by his physician. At this time his urine and blood were free from sugar. His refraction was as follows: O.D. plus 0.50 D. sph. plus 1.25 cyl. axis 165°; O.S. plus 1.00 D. cyl. axis 180°; add plus 2.00 D. sph. O.U. He was advised not to change his lenses as this would shortly clear up. One week later his refraction was: O.D. minus 0.50 D. sph. minus 1.25 D. cyl. axis 165°; O.S. minus 1.00 D. cyl. axis 180°; add plus 2.00 D. sph. O.U. This was the same correction as I had given him one year before, and he is still wearing this same correction, two and one-half years later.

With the advent of the diabetes an artificial myopia was caused by swelling of the lenses due to the low osmotic pressure of the blood, the lenses taking up water. The patient consulted the optician with temporary relief from the minus glasses prescribed by the latter. Then another change no doubt took place in his crystalline lenses, the myopia either increasing or decreasing. He consulted his family physician, who instituted treatment for the diabetes, with a resultant hyperopia from loss of the fluid from the lenses and finally a return to his original status.

The astigmatism was not altered in either of these cases.

234 Cabot street.

References

Duke-Elder, W. S. Changes in refraction in diabetes mellitus. Brit. Jour. Ophth., 1925, v. 9, p. 167.

Gifford, S. R. Ocular complications of diabetes. Med. Clin. N. Amer., 1928, v. 12, p. 423.

Post, L. Changes in refraction in diabetes mellitus. Amer. Jour. Ophth., 1926, v. 9, p. 666.

Dykman, A. B. Changes in refraction in diabetes mellitus. Amer. Jour. Ophth., 1926, v. 9, p. 825.

Burch, F. E. Ocular condition associated with diabetes. Jour.-Lancet, 1928, v. 48, p. 137.

Anderson, L. Contributions to the statistics of diabetic eye complications, Acta Ophth., 1924, v. 2, pt. 3, p. 250. (Mentioned in Burch's article.)

Spalding, F. M., and Curtis, W. S. Changes in the eyes of diabetics. Boston Med. and Surg. Jour. 1927, v. 197, p. 165.

Roberts, W. M. Increase of hyperopia in diabetes. Amer. Jour. Ophth., 1923, v. 6, p. 291.

Joslin. The treatment of diabetes mellitus, 2nd edit., 1917, p. 437.

Larsen, M. Ein Fall von transitorischer Hypermetropie bei latenten Diabetes. Acta Ophth., 1927, v. 5, p. 210.

PRESBYOPIA, THE BUGBEAR

W. W. Lewis, M.D., F.A.C.S.
SAINT PAUL

The author presents the view that early wearing of full hyperopic correction tends to cause premature onset of presbyopia. In addition, a number of practical suggestions are offered as to the convenience of the patient in wearing the presbyopic correction. Read before the Minnesota Academy of Ophthalmology and Otolaryngology, February, 1930.

To my younger surgeon friends I would say: Life's third quarter should find a man at his best but for the impediment of presbyopia, and nowhere is this more embarrassing and harassing than in the presbyopia of the ophthalmic surgeon himself.

Gone are the days and gone are the ways of youth's wonderful suppleness. Youngsters we may be in all respects but for the hobbles of presbyopia—and what are we going to do about it?

I believe the chief original sin of the oculist is the unnecessary and unwise overfull correction of hyperopia in children, youth, and young adults, in these days when the whole populace, by street-car and newspaper admonishments, is led to put on glasses. True it is that our modern civilization of speed, high tension, and close-range requirements demands relief of eyestrain more frequently than in the good old days of childhood's dreamtime. And it is right and proper that such stress from astigmatism, high hyperopia and all such, commensurate with muscle-balance requirement and good vision, be met sufficiently and rationally in the prescription of glasses. But to crowd on all the plus element, up almost to the point of cycloplegic, static refraction, without any such reason, to my mind is inexcusable.

A child's eyes are intended to be hyperopic. His muscles of accommodation are strong and supple. It is my practice to give such muscles, in the absence of convergent squint and such other contraindications, plenty of opportunity to function as they were by nature intended to do.

In the myopia of juveniles, especially, we know by experience that the most beneficial glass we can prescribe is a full myopic correction where full accommodation is called into play. Why, then, should we deny the hyperopic young person's accommodative muscles full and normal tone?

To my mind, it is by such an unnecessary crutch as overfull hyperopic correction throughout life that these persons find themselves prematurely presbyopic, and I have observed that the myope of presbyopic age generally accepts less addition for near vision than the hyperope of the same age who has long been overcorrected.

We find plainsmen, frontiersmen, and others leading the outdoor life who, well up into the fifties, have done without glasses, and who, even though hyperopic, are able to read and to do close work which their fellow creatures from the city, even at much younger age, are not able to do.

During the war it was not an uncommon experience in the army, through the exigencies of service, loss of personal effects, and so on, for men in their forties who had supposedly been dependent upon their plus glasses for years to retrieve their accommodation and get along without any thought of needing their correction. I myself had that experience.

Another error most universally made and of far-reaching effect in this matter, because it applies to such a great proportion of wearers of glasses, is the advice given to patients with low or moderate degrees of hyperopia to wear their glasses continuously out-of-doors, when without them, except in reading and close work, they have absolutely no symptoms of strain or even of fatigue. The great majority of this class of patients are happier, more free, and better off without their glasses except indoors or in close, confining occupations, and, I believe, will go many years longer before presbyopia hampers them.

Where presbyopia is upon us, whether we will or no, and has to be met, the problem presents many opportunities for thought, judgment and the advantages of experience.

First of all the strict avoidance of any closer near point than is absolutely necessary in any given patient's occupation should be carefully provided for in the presbyopic addition to his distance correction.

For the young or beginning presbyope who still has considerable accommodation for all but long continued effort, and who is quarreling with both his far and his near correction, nothing is harder to bear than the shortened range of the near-vision correction. He feels as if he were in jail. To make his cell seem any narrower than necessary is only inviting rebellion. Many a young oculist of the best and most worthy qualifications has lost patient after patient before realizing this mistake.

To give this type of person a bifocal glass for continuous wear, or for outdoor wear especially, is a mistake, for he will surely jump the traces. If his occupation is such that while at work he is not called upon for distance vision, a conservative addition (according to his occupational near-vision requirements) in the form of a whole-lens work glass would better be prescribed. Or, if he is frequently required to look up and down from his work, say about the office or shop, it is better to give him a large cement paster as an inexpensive bifocal extra or indoor work glass, with just enough distance lens above the paster segment to permit him to see about the office or factory.

It must not be forgotten that presbyopes who work over large areas, say bookkeepers, statisticians and draftsmen, cannot be limited to the field of a small kryptok segment, which would necessitate their having to move their heads when looking from spot to spot in what would even be otherwise considered a small area.

Constant consideration of patients' occupations is imperative on the part of the prescribing oculist. There is considerable difference between reading distance and working distance in a majority of occupations. Anvil workers, bench workers, carpenters, music teachers, and so on, who are required to see accurately but at a greater distance than their ordinary book-reading distance, must be provided for, and various-sized cement-paster bifocal glasses, as inexpensive extra or work glasses, are a good way out of the dilemma.

Locomotive-engine men and boilermakers must be given suitable combinations in the form of goggles, for they must be able to see their best in both near and far distances, and at the same time must be protected against the hazards of their skilled trades. Certain machine workers, such as linotype and knitting-machine operators, who work even nearer than ordinary reading distance, must be properly helped out.

Last of all, the nose-throat-and-ear surgeon, who constantly uses the upper half of his glasses in looking into the nose and ears, must have his help in the form of inverted paster segments at the upper part of his glasses, and these even stronger than his reading addition.

A very good combination for the ear-nose-and-throat man is a trifocal made in the form of a regular kryptok with small reading segment below, his distance correction in the middle, and a stronger inverted paster segment at the top of his glasses. In this way, back and forth about the office, he is constantly equipped with all he needs for the various kinds of work. Then, in addition, if for high magnification he has lying around at different places several Beebe binocular loupes to slip in front of his trifocal combination, he can go all day long without removing his office glasses.

As the presbyope gets older and more dependent upon his near addition he usually becomes, of course, more docile, but even from then on, though less range can be given him as he becomes more definitely dependent on precise additions, it is far better to err

by giving too little than too much addition. More than two and a quarter addition, even toward the sunset of life, is practically never needed.

I am sure that one of the most universally indulged and careless shortcuts that we fall into is taking for granted that accommodative power in the two eyes is equal. It will be most surprising to many of us, even those of long experience in refraction, to learn the frequency with which patients come before us for whom we ourselves have worked out carefully determined distance corrections and who require unequal reading additions for the two eyes.

The idea that an actual ciliary paralysis or partial paresis of accommodation is necessarily present to cause such an inequality will soon be exploded if careful observations are made. We can continue to put the same addition before the two eyes, and, roughly, if one eye and then the other sees reading type about equally well close up and also at arm's length, the odds are that both eyes have equal accommodative power. But if there seems to be even the slightest indecision on the part of a well-balanced, sensible patient, the near and far points for reading type would better be worked out with each eye separately to determine the respective additions required.

After a carefully worked-out refraction at six meters for each eye and, too, with normal vision for each, it is not an uncommon experience to find that one eye requires a quarter or a half and occasionally three-quarters diopter more sphere to give equally clear near vision at close range. Whether this condition is a matter of unequal innervation, or of muscle strength, or of both matters not, but it is surely not a matter of partial paresis as we apply the term generally, and for the welfare of the patient in visual acuity and comfort the difference should be allowed for and prescribed.

That the loss of accommodation breaks the speed and "breaks the heart" of a man in what may otherwise be for a much longer time an untrammelled career is never more evident or more real than to the ophthalmic surgeon himself, and this fact should lead him to careful thought and earnest effort to spare his fellow creatures such a premature impediment.

836 Lowry Medical Arts building.

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

February 14, 1930

Dr. Charles N. Spratt, president

Presbyopia

Dr. W. W. Lewis (Saint Paul) read a paper on this subject which will be published later in this Journal.

Discussion. Dr. H. W. Grant (Saint Paul) felt that, in the main, Dr. Lewis' points were very well taken. Overcorrection of the reading portion of a bifocal lens was an error often committed. It caused a distinct loss of the range of accommodation. Even a +0.50 diopter sphere was often more satisfactory than a +0.75 or +1.00 sphere for beginners. Some presbyopic corrections could be reduced even after they had been worn for a year or so.

There were certain changes, however, which took place in a lens during presbyopia which were not entirely due to loss of accommodation. This was well evidenced by the failure of the lens to shut out some portions of the spectrum which were more irritating and perhaps destructive tó the eye. Dr. Grant said he was much interested in Dr. Jackson's statement that he prescribed full correction for all, and that one patient had blurred distant vision for eighteen months. The idea of full correction was to make people comfortable and by this they were made comfortable as in no other way. This was often true even in exophoria with convergence insufficiency. Children with convergent squint were not given a fair chance without a full correction from the beginning, and Dr. Grant felt that Dr. Lewis was in accord with this view also. After Dr. Jackson's lectures, Dr. Grant said he had been prescribing more full corrections and he believed the patients had more comfort, and in a short time could get along better with a full correction than with a partial correction.

Dr. Charles N. Spratt (Minneapolis) felt that this was a very important subject, as a large part of the work of ophthalmologists was in refraction. He called attention to Dr. Osler's statement that one should not treat a condition until he had had it himself. Dr. Spratt stated that his own experience had been different from that of Dr. Lewis, in that he had found a full correction for reading to be an advantage. He was now wearing an opifex cemented-on segment 8 by 14 mm. and had worn one 7 by 11 mm. The latter was perfectly satisfactory for every type of work except reading a book with wide pages. He felt, as Dr. Lewis stated, that the type of work the patient was doing made quite a difference in the strength of the glass to be ordered. He felt that the chromatic aberration in the Kryptok lens was a nuisance. This lens was theoretically wrong in that the wafer, composed of a piece of flint glass, should be made thick at the edge like any other achromatic lens, rather than thin. Dr. Spratt stated that one learned much about these when he wore them himself.

Dr. George E. McGeary (Minneapolis) said that early in his practice he had found that patients with presbyopia had a habit of having their refractions done late in the day when the reserve strength in their ciliary body was exhausted. As a result, they would accept higher reading corrections than were necessary. It was common for them to return in a few days with the complaint that their reading lenses were too short in their range. Dr. McGeary said that he had made a practice in recent years of requiring these patients to return for a second examination in the morning hours, when the ciliary body was in better tone, before ordering the reading addition. This practice had given him much better results in handling presbyopic patients.

DR. LEWIS, in closing, recalled the story about the woman who had never had any children thinking she was qualified to tell other people how to bring up their children, and he maintained that any one who had not gone through presbyopia did not know anything about it. He had for years made use of the paster prism of which Dr. Spratt spoke. The glass he was speaking particularly about was for office work for the man who was probably not going to read a great deal and did not want to sacrifice any more of the distance space than he had to; therefore, Dr. Lewis felt that the paster, more economical in size below, was a great convenience. For the nose and throat man who did not want to change glasses all the time, he advised a Kryptok with a paster above, of the strength he preferred. Very often one would take an addition in the Kryptok segment of plus 1.50 sphere and often for close inspection of the nose, throat, and ear one would want to get closer than book-reading distance, and where there was plus 1.50 sphere below one would find that a plus 2.00 above was very acceptable.

Dr. Lewis stated that until recently there had not been a great deal of opportunity for choice in these so-called invisible bifocals, but now with the different kinds of glasses shown in trade there was more to choose from. There was the small Kryptok and another which gave the wide broad segment below. Dr. Lewis felt that one should consider the occupation of every patient prescribed for; how large a field he was going to work on, and his reading and working distance. He said he very often made use of the paster in preference to the flint glass segment where unusual-sized segments were needed. One could have ground into this paster nearly anything wanted; for example, a two or three degree prism according to muscle requirements. He felt sure that if the men would make use of the paster segments more than they did now, they would be better satisfied and the patients better satisfied also.

Sympathetic ophthalmia

DR. CHARLES N. SPRATT (Minneapolis) presented a young boy who had sympathetic ophthalmia. This case will be reported in full at a later date.

W. E. CAMP,
Recorder

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

February 20, 1930

DR. H. MAXWELL LANGDON, chairman

Repair of lids by skin grafting

DR. BURTON CHANCE presented the case of a man whose four eyelids he had restored to usefulness by skin graftings. The patient's face, head and neck had been severely burned. The corneas were ulcerous and all four lids everted by cicatrization. The globes were now protected, the corneas healed, the cicatrices on them fading, and the man had useful sight so that he was able to perform yard duty.

Discussion. DR. GRISCOM said that about four years ago he had shown a case before the Section somewhat similar to the one exhibited tonight by Dr. Chance. Following an extensive burn of the face, due to a gas flame, the patient had a bilateral cicatricial ectropion of both lids. The operation consisted in freeing the lids by dissection and performing a tarsorrhaphy after which a large Thiersch graft was placed over the denuded area and a firm bandage applied. The ultimate results were entirely satisfactory.

Retinoblastoma

DR. BURTON CHANCE gave a further report on a case presented in November. It was recalled that in the left eye of a healthy, vigorous Italian boy, a whitish fungous mass, which filled a large portion of the vitreous chamber without provoking inflammatory symptoms, was found. The tension of the globe was not elevated. The disease had become manifest only a month or so previously. When the case was

studied in November there was some doubt as to the diagnosis; the concensus of opinion, however, pointed to glioma. The boy went home over Thanksgiving. On his return the Saturday after, it was seen that the mass had grown larger, and the eye was painful. Enucleation was performed and the globe sectioned. The mass resembled a collection of inflammatory exudate. In December it was reported that the only cells found in the many sections studied were of an inflammatory nature. Dr. De Long and Dr. Chance were not satisfied with these findings so the remainder of the block was cut and studied, with the result that in the portion in the lower nasal quadrant of the globe there was found a mass of true neuroblastomatous cells in the retinal tissue. Neither the nerve nor the choroid had been involved. The aberrant cells were occupied by very large nuclei.

Dr. Chance said such a case as this presented confusing characteristics. When the transilluminator was applied there were no shadows, but could there have been, when the mass was on the posterior wall of the globe?

Cholesterin in the anterior chamber

Dr. Leighton F. Appleman showed a case which had come under observation at the Wills Hospital February 1, 1930, because of poor vision in the left eye. His right eye was blind, due to the formation of a cataract within a month following a blow upon this eye fourteen years previously. Inspection of the eye showed the cornea clear; anterior chamber clear, slightly deeper than normal; pupil round, 4.5 mm., slightly dilated, no reaction to direct light but indirect reaction prompt. Lens remained clearly visible in the pupillary space. There was no light perception nor irritation of the eyeball.

On February 11, 1930, he struck the right eye against a chair. On the 13th, he came again to the clinic with the statement that following this blow the eye was painful. There was injection around the cornea though the cornea itself was clear, the anterior chamber slightly cloudy and containing a few cholesterin crystals. No fresh blood was present. He was taken into the hospital and local treatment was given. The accumulation of cholesterin crystals increased until they practically filled the anterior chamber, together with an exudate or deposit which looked like lens material. It now seemed to be settling to the bottom of the chamber. With the slit-lamp it could be seen that the zonule was broken on the temporal side and the lens displaced inward and slightly downward. The iris too was seen to be greatly congested, and numerous small vessels could be seen over its surface.

The speaker said that it was rare that cholesterin crystals appeared in the anterior chamber. In this case he believed they came from the vitreous as the result of a break in the zonule following the recent injury. Their presence in the vitreous previously could be assumed to have occurred as the result of degenerative changes following the injury fourteen years ago. At this time, nine days after the injury, the cholesterin crystals seemed to be settling to the bottom, as the upper half of the anterior chamber was much clearer than two days ago.

Discussion. Dr. Zentmayer said he had seen at the Wills Hospital a case of iridocyclitis in which there were large masses of cholesterin crystals in the anterior chamber. The chamber was washed out with salt solution but refilled with cholesterin. The condition continued to recur and the eye was ultimately enucleated. Because of the recurrence of the condition it was thought at the time that crystals probably found their way from the vitreous into the anterior chamber. The position of the lens and the condition of the zonule could not be determined.

Dr. Chance said that some years ago when Dr. Koeppe was giving a course of lectures at the Wills Hospital, he brought a patient who had had an accident, and with the corneal microscope there was demonstrated the presence of these crystals. Dr. Chance had never

seen a case similar to the one shown tonight wherein so many cholesterin crystals floated in the aqueous.

Dr. Cowan said that he had seen this case at the Wills Hospital and had examined it with the slit-lamp. He had never before seen a case of this kind. The aqueous was slightly cloudy and the anterior chamber filled with brilliant red, green and silver crystals.

Heterochromic cyclitis

Dr. Warren S. Reese brought a case before the Section which he thought might be of especial interest in view of Gradle's recent paper. A young lady, aged twenty-one years, had consulted him last November for a routine eye examination. The external examination at that time, as at present, was negative except for the heterochromia. Her mother was certain that her daughter's eyes were both the same color as a child. The change in color appeared about the age of twelve when she was examined by an optometrist whose meager record was secured.

Ophthalmoscopy now revealed a descemetitis, beginning cataractous changes and numerous vitreous opacities. Vision was improved to 18/30. Both eyes showed a compound hyperopia but the error was small in the unaffected eye, whereas the left or affected eye required a rather high cylinder. The optometrist had found a somewhat similar change, so that presumably this difference was congenital. The cause of this affection would appear to be the teeth.

It should be understood that there were two main types of heterochromia, the congenital and the acquired, the latter due to some pathologic change as in the present case. The extreme chronicity of these cases was very remarkable; likewise the absence of inflammatory symptoms and posterior synechiæ. The use of a mydriatic might be a perplexing question; none was used in this case until recently when the eye became painful. The pain was relieved by homatropin.

Discussion. Dr. Cowan said that with the slit-lamp this was the usual picture of heterochromic cyclitis—precipitates on the posterior surface of the cornea, specks in the aqueous, deposits in the pupillary space, changes in the iris and in the lens.

In the right eye were a few pigment deposits such as were often found and considered by some to be remains of a pupillary membrane. There were a few of the same kind in the left eye, but here, besides the pigment deposits, there was an almost complete meshwork of exudate on the anterior surface of the lens. There were many atrophic areas in the iris, especially around the pupillary margin. The changes in the posterior portion of the lens lay in front of the capsule in the cortex; those in the anterior portion consisted of opacities and vacuoles under the capsule. This was the paler of the two eyes.

Dr. Cowan said that, while it might be true in cases of heterochromic cyclitis that a pale iris preceded the cyclitic and lenticular changes, he felt certain that after a cyclitis in any eye there was often loss of pigmentation of the iris. In a case of such long standing as this we should expect the iris to be lighter than that of the healthy eye. Pigment migrated and was carried into the lens surface and was also deposited on the posterior surface of the cornea.

Dr. Zentmayer said his interest in heterochromia iridis had recently been renewed by seeing a woman aged forty-four years with this condition, associated with Raynaud's disease of the first degree. It was difficult to know whether the eye condition had been acquired or whether it was congenital. Notes taken by former ophthalmologists made no mention of a difference in the color of the irides. The right iris was of a blue-grey color and the left a hazel. The right pupil was 4.5 mm., left pupil 3.5 mm. In the right eye there were precipitates on the posterior surface of the cornea. With the slit-lamp they appeared a light grey in color with crenated edges and were fairly evenly distributed. There were a few fine vitreous opacities. The iris was partially atrophic, the stroma had a

somewhat fibrous appearance, and the crypts were almost eliminated. The vision in the right eye was 6/6 and in the left 6/5. The tension was eighteen mm. in the right eye and twenty-two mm. in the left. There was a compound hyperopic astigmatism in each eye. Aside from Raynaud's disease the physical examination was negative. There were no indications of tuberculosis or lues.

The association of local asphyxia might have been more than a coincidence. There were on record at least two cases of heterochromia iridis with a Horner syndrome, and the cause of Raynaud's disease was a sympathetic disturbance. Of course, if there was a sympathetic element in these cases it would be paralytic in Raynaud's and Horner's diseases. Gradle in his recent paper on heterochromia iridis asked the pertinent question why these cases with a moderate degree of cyclitis, which he thought to be probably of tuberculous origin, almost invariably developed cataract, while this did not occur as a rule in frank cyclitis of similar origin, with exudate lasting over a long period. In his series of thirteen cases the only evidence of tuberculosis, however, was a positive Pirquet in three cases.

DR. CHANCE said he was very much interested in the classification which Dr. Reese had given. In the first ten years of practice he had hunted out congenital malformations. In that time he saw many cases of heterochromic irides and had followed many of them, but could not recall any which later became inflamed. He would, therefore, consider all such as congenital types. He had, however, seen numerous instances where discoloration had occurred after iritis, yet he doubted if many of the congenital type became inflammatory. He had known a young lady, aged twenty-six or twenty-eight years, all her life, the iris of one eye being half gray and half brown. She had never had any inflammatory signs in her eye.

DR. LANGDON said the change in color of the iris which came on after iritis and which was due to congestion and exudation into the iris, was very different from the change in color which was consecutive to degenerative processes where there was atrophy and where it was due to pigmentation. It seemed to him that this was the condition in the present case of Dr. Reese.

Hole at the macula

DR. GEORGE H. CROSS said that this condition was brought to our attention in 1869 by Dr. H. Knapp and in 1871 by Dr. H. D. Noyes, and more thoroughly studied by Kuhnt and Haab in 1900. It was after this date that these cases were reported more freely.

Holes at the macula might be divided into two general groups—traumatic and nontraumatic. As the case he wished to present this evening was produced by traumatism, his remarks would be confined to cases in that category. During the war, while stationed at Camp Meade, he had encountered from four to six cases, all in men who gave a history of accidents occurring in civil life. One case was that of a colored man who stated he had been hit on the head with a baseball bat.

Following the War, at the U. S. A. General Hospital no. 11, Cape May, there were a number of cases of hole at the macula following the traumatism of war injuries. One very extraordinary case was published in the Government Medical History. This white man, aged twenty-two years, was struck by a machine gun bullet which entered the malar bone three centimeters below the external canthus of the left eye, traveled across the face, and emerged below the right eye at the inner canthus. Photographs were exhibited which showed the hole at the macula, four ruptures of the choroid, numerous cholesterin crystals and a large area of choroidal disturbance.

The second case was that of a white man aged eighteen years who was wounded in France August 11, 1918. He had three large depressed scars with loss of bony substance in the right frontal region. In the right eye he had an oval hole in the macula, deeply pigmented and with cholesterin crystals

present. There was some retino-choroidal pigmentation along a branch of the upper temporal artery. A water-color drawing of this case had been made.

The case shown at the section was of a boy aged fifteen years, struck in the left eye with a football in the summer of 1928. Following this injury the hole in the macula developed. This hole was of the typical slightly horizontal type with numerous cholesterin crystals seen. There was a marked retinochoroidal disturbance. His vision in this eye was 20/100.

The pathology of macular hole as studied by Fuchs, Coats, Hippel, and others seemed to point to a cystic degeneration in the retinal layers with subsequent rupture and formation of a hole. Coats thought that the degeneration was due to an edema of the retina at the posterior pole, involving usually all of the layers of the retina, but at times the inner layers only.

Discussion. Dr. Zentmayer said he had seen quite a number of cases of hole at the macula. One interesting case he recalled was the result of edema from sclerosis of the macular branch of the superior temporal artery, in an old lady. The localized edema had caused a typical hole in the macula about one-third the diameter of the disc. Nearly all these cases had a very fine pigment rim, the result of turning out of the pigment layer of the retina.

Dr. Chance said eight cases were referred to him at the Army Hospital in Cape May. He recalled one in which there was no actual wounding of the eye; there had been an explosion a great distance away. There had been an immediate laceration of the retina from the effects of an "air blow". Dr. Burkholder had illustrated a similar case.

He thought it might be of interest to the Section to hear of two early records of this type of case. In going over the records of the late Dr. Thomson he was attracted by a very complete sketch, which Dr. Thomson had made in the early 70's. It was the case of a young woman who had been struck in the eye by a rubber ball filled with water. Dr. Thomson apparently thought he was dealing with a congenital condition and did not associate it with the accident. The second case, recorded in 1887 and of which careful drawings were made, was in a young lady struck in the eye with a half of a lemon. These cases were probably not reported in the literature.

Dr. Cross, closing, said that many cases of so-called hole in the macula were really not of hole in the macula. He had been asked to see a case a few days previously and found it was simply a case of central macular choroiditis, and he thought it possible that other cases of macular choroiditis had been reported as holes at the macula.

Treatment of vernal conjunctivitis by radium

Dr. Ronald C. Moore, by invitation, reported the case of a boy aged twelve years, who had vernal conjunctivitis for two years. He reported first to the Eye Dispensary at the Presbyterian Hospital in May, 1929. Radium treatments were started in October, 1929, two treatments to the right lid and one to the left. The boy was now symptom-free.

Radium could be more accurately dosed than x-rays; therefore, it was the better remedy. If too great a reaction was produced, cataract, glaucoma, atrophy of the iris or destruction of the eye might result. In conclusion it might be stated that vernal conjunctivitis could be relieved with radium in the proper dose in all except the limbal form, where danger of damage to the globe prohibited its use. Radium in proper doses had been very favorably reported on by most authorities.

Discussion. Dr. Shumway said that the patient to whom Dr. Moore had referred was reported before the section in 1918. Originally seen in 1913, he had been treated with eleven or twelve mg. of radium, which was all that was available at that time, but without success. Subsequently in 1918 he had been treated with doses of 35 to 50 mg. by Dr. Pancoast, the lid be-

ing everted and the filtered radium applied close to the conjunctival surface. The thick lid masses disappeared permanently. He had reported three other cases before the Section on Pediatrics of the State Medical Association in 1918, also with cure of the condition. One case was a private one, and had been seen frequently since then. The conjunctiva was smooth but atrophic and had a tendency to form a skin-like epithelial coating, which had to be rubbed off. The danger of the method lay in the loss of eyelashes, which usually, but not always, returned. The lid masses were more than thickened epithelium, true fibrous tissue being formed, with much elastic tissue, and ordinary treatment had no effect on them. He had never had any success from the use of fibrolysin.

Dr. Louis Lehrfeld said that through the courtesy of the staff of the Wills Hospital he had resumed his studies of vernal conjunctivitis, which began in the clinic of Dr. Burton Chance in 1924. Last year the studies were confined principally to the various therapeutic measures commonly used in the treatment and cure of vernal conjunctivitis. Among these therapeutic measures considered was the use of radium. Of eighteen cases referred to him last year, eleven were treated by radium.

In cooperation with Dr. Widmann and Dr. Spackman, he was planning to so standardize the use of radium element in the treatment of vernal conjunctivitis that it might be used uniformly by all radiologists and ophthalmologists with safety and with definite results. Dr. Lehrfeld said that in as much as radium had been heralded as a specific remedy for vernal conjunctivitis, this particular measure of treatment was selected with a view of determining definitely its efficacy and manner of application. In view of the possible dangers to the eye by the use of unfiltered radium, treatment was begun in a series of eleven cases, using fifty milligrams of radium element, filtered by a brass capsule one millimeter in thickness, and by rubber two millimeters in thickness.

The application was made directly through the closed eyelids, so that the entire conjunctiva and the cornea might receive the benefits of the radiation. This was thought to be an advantage over the application to the everted eyelids because it was impossible to get uniform application to all parts of the eye with the eyelids turned up. Since vernal conjunctivitis might affect all parts of the conjunctiva and not the lids alone, it was felt that the application through the closed eyelids with the protection of the eyelashes with a plate of lead was advantageous.

The application was made for a period of one-half hour, the radium being exactly three millimeters from the skin of the eyelid, and there was delivered twenty-five milligram hours of radium. The interval between treatments was one week. The dosage of radium was estimated as being the minimum amount which would give beneficial results as determined by the experience of other investigators. It was planned to give routinely six applications of radium. This was varied, however, and more applications were given if the case under consideration had been of long duration, and the pathology was extensive.

The fact that each and every one of the eleven patients reported for the whole course of treatment was indicative of the fact that they must have obtained some benefit. Observations indicated, however, that patients required at least three or four applications before the desired relief from symptoms was manifest. There was no question in his mind that the patients all obtained marked symptomatic relief, which was gradual in character, but perceptibly evident by a gradual diminution of the discharge and of lacrimation. A recession of the pathological findings was not especially noted until all the radium applications had been given. Attempt was now being made to prove definitely whether radium would cure vernal conjunctivitis. Many investigators reported cures. But a large proportion of cases recovered spontaneously without medication.

By way of argument, and realizing that vernal conjunctivitis was an ocular manifestation of an allergy, it was hard to conceive that the removal of the pathological state during one season of attack would prevent the occurrence of another attack the following season. In other words it must be necessary for the radium to desensitize the patient against the susceptibiity to the various proteins responsible for the disease. Dr. Lehrfeld said the investigations would continue in the effort to prove or disprove the specificity of radium in vernal conjunctivitis. He felt, however, that radium had tremendous effects in alleviating the symptoms, principally that of itching.

Dr. Moore, closing, said that he appreciated Dr. Shumway's point of properly gauging the dose of radium, as this was the most important thing in the treatment of these cases. If it were not properly gauged the lashes would drop out.

Ephedrine and glaucoma

Dr. A. Barlow (by invitation) said a possible causal relationship between ephedrine and glaucoma was suggested by the occurrence of acute glaucoma in five patients after ephedrine had been used in the nose for suspected sinusitis. The patients, four females and one male, were all past middle life, at which time the susceptibility of glaucoma increased. It was possible that, while ephedrine might have no effect on intraocular tension in young persons and in persons with no glaucomatous tendency, yet it might act as an exciting factor in elderly people with a glaucomatous predisposition.

A. G. Fewell,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

March 17, 1930

Dr. Charles G. Darling, president

Molluscum contagiosum and associated follicular conjunctivitis

Dr. Harry Gradle presented a case which was interesting because of its rarity. This patient had complained of irritation of the eye, and examination showed three small wartlike masses: one on the lower lid, one on the upper lid, and one on the skin of the nose. The conjunctiva of the affected side presented a typical picture of follicuiosis, whereas the conjunctiva of the other side was normal. According to Elschnig, there is an intimate etiological relationship between unilateral follicular conjunctivitis and the presence of molluscum contagiosum around the eyelids. The only treatment necessary is the expression of the molluscs. Photographs were taken of this case before the follicles were expressed.

Persistent posterior fibrovascular sheath of the lens caused by fetal iritis

Dr. Vernon Moyne Leech read a paper which will be published in the American Journal of Ophthalmology.

Discussion. Dr. Robert Von der Heydt said that about seven years ago Dr. Lane had a case which he thought was one of retention of part of the anterior fibrovascular sheath of the lens. It was studied under the slit-lamp. It was now known that this case was one of a new clinical entity, since isolated, viz., sclerosis of the lens capsule (Kraupa), or "glaucoma capsulare", as it is called by Vogt, because of the tendency to hypertension.

Morphology of senile cataract

Dr. Robert Von der Heydt gave a discussion of this subject.

Importance of routine examination of accommodation

Dr. Thomas D. Allen spoke on this subject.

Robert Von der Heydt,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

March 17, 1930

Dr. R. J. Warner, chairman

Perforating injury of the eyeball

Dr. Hilliard Wood presented Mr. A. S., aged twenty-nine years, who had been referred to him on March 5, 1930.

He gave the history of having injured his left eye on March 3rd. While hanging his axe over a thorn bush a thorn stuck in his left eye. Vision of the right eye was 20/20 and of the left 20/40. About the middle of the upper border of the tarsal cartilage of the left upper lid was what seemed to be a recent pinhole perforation of the lid; the surrounding skin was slightly discolored red. This opening in the skin had practically closed, but there was a small point indicating recent perforation of the conjunctival surface of the lid at the upper border of the tarsal cartilage. About 3 mm. above the upper corneoscleral margin at the twelve o'clock position, was a pinhole perforation of all the coats of the eyeball. There was a black speck, not larger than the cross section of a small needle. Whether this black speck was the end of a thorn, or whether it was the uvea showing through the perforation was the question. Through this opening exuded the tiniest bit of what seemed to be vitreous.

Scopolamin was instilled and the pupil dilated fairly well, but not to the maximum. The ophthalmoscope showed several small streaks of blood extending from the point of perforation of the uvea downward through the vitreous to a point near the center of the eyeball. There was no single uninterrupted streak to indicate that either of these was a piece of thorn. Transillumination showed the perforation a bright red, indicating that the dark object seen by direct view was uvea, and not a foreign body.

On March 12th examination showed R.E.V.=20/20; L.E.V.=20/50, with plus 1.50 sph. = 20/25.

Tuberculous keratitis

Dr. Guy M. Maness reported the case of N. G., a white female, aged fifty-nine years, first seen on March 27, 1929, complaining of a scum over her right eye for two months. The late Dr. E. B. Cayce had done a cataract extraction on this eye in November 1928. The visual result had been excellent for three months, when vision gradually became blurred to the extent that she could not see to walk alone. There was practically no pain, photophobia, or lacrimation. Vision in the left eye was very poor, due to an existing cataract.

Examination revealed a slightly immature cataract of the left eye without any other visible pathology. Vision was limited to ability to count fingers at three to four feet with either eye. There was a marked interstitial keratitis involving the lower two-thirds of the right cornea, with no ulceration. The slit-lamp showed a diffuse involvement of the whole thickness of the lower two-thirds of the cornea interspersed with many dense areas of whitish infiltration. There were many brownish deposits on Descemet's membrane. The iris showed a slight amount of inflammatory reaction. She had arteriosclerosis and a hypertension of 206/110. The chest was clear. The Wassermann and other laboratory work were negative.

After operation on an empyema of the left maxillary sinus, she was given mercury and iodides internally, and atropin and hot compresses were used locally. The iritis cleared, but the corneal condition showed very little improvement. Seven months after the sinus operation the eye condition seemed quiet. A discussion of the secondary cataract was then done. Immediately the keratitis became more marked, and an ulcer of the lower portion of the cornea occurred. After one month, the corneal ulcer had almost healed, leaving quite a dense opacity. The ulcer had shown little response to the use of twenty-five percent argyrol, hot compresses, twenty percent neosilvol, yellow oxide of mercury ointment, and milk injections.

A tuberculin test was positive. Disensitization was started with 0.00001 mg. O.T. subcutaneously, repeated twice a week, doubling the dose each time until at her last treatment she received 2 mg. Rapid clearing of the cornea followed within one week. Vision rapidly improved. One month later the cornea showed not more than one-half the original infiltration. At present, which was about three months since the

O.T. was begun, she had vision of about 20/100. There remained a rather extensive corneal scar which would probably not clear very much more.

While there was no evidence other than a therapeutic result that the keratitis was tuberculous, the deduction seemed justifiable. Whether the condition was due to a local infection or was merely an allergic focal reaction was questionable, but the latter was probably the case.

The speaker had had a fairly large series of cases of phlyctenular keratoconjunctivitis which when seen early were cured by desensitization with O.T., with little resultant corneal damage. The cases that were of long standing and had a marked corneal involvement practically always were markedly improved but not completely relieved of the corneal opacity. He had a smaller series of corneal ulcers of long standing that had resisted the usual forms of treatment, including removal of foci, but which as soon as treatment with O.T. was started showed fairly rapid improvement. If tuberculin had been started early in the case reported, he thought the eye would have been in far better condition at present.

Discussion. Dr. W. G. Kennon remarked that with the foci of infection removed tuberculin would clear up many persistent eye cases.

Dr. M. M. Cullom thought that about seven percent of interstital keratitis was believed to be tuberculous. All of his cases had been due to hereditary syphilis.

W. W. Wilkerson,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

April 21, 1930

Dr. Robert Warner, chairman

Bilateral enucleation of ruptured buphthalmic eyes

Dr. Robert J. Warner reported the case of A. M., white male, aged seven years. He was born with large eyes which had been diagnosed in early infancy as buphthalmos. All other physical examinations were negative. He had a vision of counting fingers at about twelve feet in each eye.

November 13, 1929, while riding on a small wagon he ran into a telephone pole and the tongue of his wagon struck him in his right eye causing a rupture of the eyeball. The right eye was enucleated the same day under ether anesthesia. There were no complications at operation or postoperatively.

On April 9, 1930, while in the garden with his father he was struck in his left eye with the end of a hoe handle, which caused a rupture of the left globe. The rupture was about one-half inch in length extending across the ciliary body. Severe hemorrhage followed. Calcium lactate was administered and the protruding iris was excised. There was no light perception. The eye was very soft and painful. On April 13, 1930, Dr. Kennon, who was called into consultation, agreed that the eye should be removed. On April 14th the left eye was removed under ether anesthesia. No complications followed.

W. W. Wilkerson,
Secretary.

LOS ANGELES COUNTY MEDICAL ASSOCIATION

Eye and Ear Section

April 7, 1930

A. Ray Irvine, president

(This meeting was a clinical one presented at the Los Angeles General Hospital by the staff of that hospital.)

Retinitis proliferans

Dr. John Osborne presented a thirty-year-old man who gave a history of long standing blindness in the right eye and recent diminution of vision in the left eye. Upon examination the right eye showed decreased tension, beginning complicated cataract, and an organized mass in the vitreous, containing many cholesterin crystals. The left eye showed a typical picture of well advanced retinitis proliferans with evi-

dence of a recent vitreous hemorrhage. The Wassermann reaction was negative.

Sympathetic ophthalmia

Dr. George McCoy stated that true destructive sympathetic ophthalmia was a rare condition, as he had seen only two or three cases in a rather extensive practice, in which injured eyes were fairly common. He emphasized the necessity of pathological examination with the microscope to confirm the diagnosis. In his opinion sympathetic irritation or inflammation of mild degree was rather common. As its remote cause one might have foci of infection present elsewhere in the body. Therefore, after eye injuries, as a prophylactic measure, foci of infection should be eliminated. Tuberculosis deserved more attention as an etiological factor of these mild cases of uveitis, but did not assume the importance in this country that it was given in the European clinics.

Glaucoma with intraocular hemorrhage

Dr. H. J. Friesen presented a man about thirty-five years of age upon whom an iridectomy had been done for glaucoma. Following this an iridocyclitis had developed with marked increase in tension. After eliminating all foci of infection a trephining was done, after which an intraocular hemorrhage occurred. At present the globe was soft, irritated, and there was no light perception.

Modification of Elliot's trephine operation

Dr. Clifford Walker showed an Elliot trephine which had a window cut in its side, 1 mm. from the tip. After the disc was outlined, a scleral suture was passed through it with a Carrel needle and was carried through the trephine and out the window. By means of the suture one exercised traction on the disc as the trephining progressed and there was no danger of losing the disc as it remained attached to the thread. The depth to which the trephine was penetrating was always visible on account of the 1 mm. distance between the trephine edge and the window. The traction on the disc also avoided increasing the pressure in the eye as it furnished a counterpressure for the force used in applying the trephine.

Plastic surgery of the lid

Dr. L. A. LaMotte presented several cases of plastic surgery of the lids, particularly following burns. In most cases free skin grafts were used.

Slit-lamp examination

Dr. J. G. Kinney demonstrated the technique of examination with the slit-lamp.

M. F. Weymann,
Recorder.

LOS ANGELES COUNTY MEDICAL SOCIETY

Eye and Ear Section

May 5, 1930

Dr. A. Ray Irvine, president

Eclipse blindness

Dr. H. Thornburg presented a man about thirty years of age who had been photographing the last sun eclipse. He observed the sun through a piece of developed film with the right eye. Four hours after the eclipse he noticed that he could not see out of the right eye. Examination showed faint peripheral light perception and an area, about seven disc diameters in size, in the central portion of the fundus, which appeared white. The macula showed a dull gray-brown color. A diagnosis of retinal edema was made at this time. One week after the eclipse the vision had remained only perception of light.

Discussion. Dr. Rogers called attention to the relationship between this condition and blindness produced by watching the acetylene torch.

Dr. Beigelman stated that a German preparation called corodenin had been used with success for protection from ultraviolet light, especially by motion picture actors.

Dr. Weymann called attention to the

work of Verhoeff in which he was unable to produce retinal disturbances with ultraviolet light from the arc lamp when the heat rays were filtered out. The retinal disturbance in eclipse blindness was probably produced by the focusing of heat rays on the macula, and not by ultraviolet rays. There had also been some dispute as to the practical efficacy of corodenin in protecting the eyes from ultraviolet light.

Keratitis and iridocyclitis treated with intravenous typhoid vaccine

DR. GEORGE MCCOY presented a man about thirty-five years of age who had been first seen in November, 1929, with a visual acuity of counting fingers in either eye. There was a bilateral keratitis and iridocyclitis. The keratitis was of a parenchymatous type. Infected tonsils, an infected incisor tooth, and an intestinal amebiasis were found and treated. No improvement occurred until intravenous typhoid vaccine was administered in an initial dose of twenty-five million organisms. After the first dose prompt improvement was noted and after the fourth dose recovery was almost complete. At present there remained a leucoma on the left eye but there was no evidence of inflammation.

Chronic anterior uveitis

DR. BEIGELMAN called attention to the common belief that chronic anterior uveitis was usually due to tuberculosis. In six cases observed by himself there was a late stage of luetic infection, as the duration of the lues was from fourteen to thirty-two years. In these patients elimination of all other foci of infection had no effect on the uveitis. Specific antiluetic treatment also had little effect as is usually the case in the treatment of late lues. One case improved after tuberculin therapy, although the tuberculin reaction was negative. Dr. Beigelman thought that the improvement was due to the nonspecific effect of the tuberculin. Treatment with foreign protein of various types gave the most satisfactory results in all cases. In one case where aolan had no effect, the use of typhoid vaccine was successful in clearing up the condition. Dr. Beigelman wished to stress the importance of late lues as a factor in the production of chronic anterior uveitis.

Typhoid vaccine therapy

DR. H. WHALMAN presented an historical review of nonspecific foreign protein theory and called particular attention to the work of Howard with typhoid vaccine. His rather extensive experience with this method at the Los Angeles General Hospital was cited in the form of numerous case reports. The cases treated included trachoma, conjunctivitis, corneal ulcers and injuries, iritis, and late infection after trephine operations. He used a first dose of twenty-five million organisms and sought to produce a chill with fever in about twenty-four hours. A three day interval between doses was allowed. The beneficial effects are caused by the increase in temperature, increased permeability of the capillaries, and leukocytosis. Contraindications for the treatment are increased temperature, low vitality, or cardiac disease. Local treatment should not be neglected at the same time. The results reported by Dr. Whalman showed that nonspecific therapy usually promoted rapid healing of the conditions described.

Discussion. DR. WILLIAM BOYCE stated that he had seen Dr. Whalman's work and that the results were good. Milk did not always give a reaction because it is the bacteria in the milk that cause the reaction, and the milk might be too clean. He considered the reaction of tuberculin as nonspecific in most cases. Foreign protein treatment was not devoid of danger. He wondered if the chronic anterior uveitis described by Dr. Beigelman might not have been due to foci of infection other than lues.

DR. WEYMANN described one case of chronic anterior uveitis due to late lues in a woman in whom one eye had to be removed. In the enucleated eye a definite luetic granuloma of the papilla was diagnosed microscopically so that there seemed to be no doubt but what

syphilis was the causative factor of the uveitis in both eyes. Attention was called to the fact that in these cases, even during the time when they appeared to be well, cells might be detected in the aqueous with the slit-lamp. Dr. Weymann found that atropin did not dilate the pupil well in this case. Aolan produced no general reaction, while lactigen caused a marked general reaction and at the same time the pupil dilated fairly well. Lactigen was found to produce a better general reaction than aolan in several cases.

Dr. Ferris Arnold stated that a most marked reaction could be obtained with one-quarter minim of Coley's fluid, the endotoxin of bacillus prodigiosus and streptococcus erysipelatis.

Dr. Trainor cautioned that the patient should always be kept in bed during the administration of typhoid vaccine.

Dr. Smith said that he found milk injections useful in gonorrheal ophthalmia and ulcer. He thought that the reason that milk was more satisfactory in its use in foreign countries was that it was more contaminated there.

Dr. Kinney stated that Dr. Suker of Chicago purposely left out milk that he wished to use so that it might be contaminated.

Dr. Clifford Walker described a case of chronic anterior uveitis recently seen by him which showed improvement, manifested by disappearance of the precipitates as seen with the slit lamp, upon treatment of the tonsils, and the use of atropin and foreign protein.

Dr. Beigelman called attention to the fact that at times one foreign protein was efficacious where another failed. The reason for this was not yet known. He repeated that he could only conclude that the condition of his patients was due to lues because the removal of all other foci caused no improvement in their condition.

M. F. Weymann,
Secretary.

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EDITORIAL STAFF

WILLIAM H. CRISP, editor
530 Metropolitan building, Denver

EDWARD JACKSON, consulting editor
217 Imperial building, Denver

CLARENCE LOEB, associate editor
1054 Tower Road, Hubbard Woods, Illinois

LAWRENCE T. POST, associate editor
524 Metropolitan building, Saint Louis

HANS BARKAN
490 Post street, San Francisco

EDWARD C. ELLETT
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58 East Washington street, Chicago

M. URIBE TRONCOSO
515 West End avenue, New York

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30 West Fifty-ninth street, New York

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REFRACTION IN CHILDREN

Very many parents and not a few ophthalmic physicans have an exaggerated reluctance to plan the wearing of glasses by school children or those of preschool age. The reasons for this are several. First perhaps comes a feeling of repugnance to recognizing in this way the existence of a defect. With some people the esthetic objection is of decided significance, and in some parents it is overwhelming; they feel that the child's features are disguised and disfigured by spectacles. Of more practical consequence is the thought that the child will be hampered at play. Lastly, in both parent and physician, not excluding many ophthalmologists, there is a persistent unwillingness to believe that glasses ought to be necessary or advantageous in more than a very small number of children.

In some degree all of these objections are deserving of respect, except the last mentioned, which is in the nature of a superstition based upon incomplete understanding of facts. It is closely akin to the prejudice against the wearing of spectacles even in adult life, a prejudice which is not now so common in the United States but still prevails rather widely in some European countries.

When is it proper to put glasses on a child? Whenever this can be done with distinct advantage to the patient, either as to improvement of vision or as to relief of symptoms which are due to avoidable eyestrain.

Among most ophthalmic physicians, there is no substantial question as to the wisdom of prescribing glasses for strabismus, although there is appreciable difference of opinion as to the frequency with which glasses will relieve this condition. Perhaps the commonest mistake in this connection is that of ordering for a strabismic child considerably less than the full correction as found under cycloplegia. It is important to remember that strabismus is not usually relieved by glasses unless eyestrain has been a factor in the production of the extrinsic muscular disorder.

In this relatively enlightened age, none but religious fanatics and quacks, with a few misguided followers of the latter, will deny that some children, alike before and during school age, are seriously handicapped for the juvenile battle of life until fitted with the proper glasses.

But according to some workers, who are willing to admit the value of correcting moderate refractive errors in the adult, the frequent correction of similar errors in the school child is ill-judged and inadvisable. This belief is perhaps based upon the impression that the average child does not use his eyes so keenly as an adult, or that his physique is endowed with greater nervous and physical endurance, or that the greater elasticity of his crystalline lens will enable him to tolerate a constant effort of adjustment such as would create disagreeable symptoms in the older patient.

Yet the more important sufferers from carelessness or skepticism as to the correction of juvenile refractive errors are those children, of normal or even brilliant mentality, whose need for glasses is not such as to give rise to any disturbance in the extrinsic ocular muscles, or to produce a noticeable reduction in visual acuity.

In children as well as in adults, symptoms due to eyestrain are more likely to appear in those of delicate physical constitution, unstable nervous equilibrium, or exceptionally eager and intelligent mental reactions.

Practically all the symptoms arising from eyestrain in adults may rest upon a like basis in children. Not to recognize this fact is often to do injustice to a child who is brought on account of a suspicion of refractive error.

While the refractive measurement of children's eyes is often regarded too lightly, it is on the other hand sometimes credited with being more difficult than it really is. Many people (and this includes some ophthalmic physicians) make the mistake of exaggerating the extent to which the cerebral processes of the young school child are inferior to their own; and such individuals therefore depress and inhibit the child's mind by treating him as belonging to a lower intellectual plane; when, as a matter of fact, much more may frequently be accomplished by a judicious attitude of mental equality, encouraging the child's mind to display its powers.

In the experience of the present writer a large proportion of the children who are brought for an opinion as to the need for wearing glasses are just as easy to examine down to the smallest fraction of ametropia (whether the error be spherical or astigmatic), and just as alert and interested in responding to subjective tests, as the intelligent and cooperative type of adult patient.

It is a mistake to assume that all young children, or even the majority of them, should be refracted merely with the retinoscope. A great many measurements made with the retinoscope, alike in children and in adults, are not sufficiently final or precise for the best results, but can be improved in important details by careful and skillful application of the subjective tests. In the majority of children, quite as much as in the majority of adults, inexact refractive work is likely to be punished by failure to obtain relief from disturbing symptoms of eyestrain.

The parents of the child whose eyes are subject to frequent attacks of redness, or hurt during study, or who is occasionally affected by nausea during his school work, or who during the reading lesson misses individual letters or miscalls words, are too often told that there is no evidence of a need for glasses, that the eyes are practically normal, and that no such error of refraction exists as would justify inflicting glasses upon a young and active child. Or, after a reasonably careful examination under cycloplegia, much too frequently the mistake is made of prescribing less than the full correction. Whatever difficulty may be experienced in persuading adult patients to wear the full correction found under cycloplegia, the great majority of children, provided reasonable willingness to cooperate exists, display little real difficulty in becoming accustomed to the full correction as determined by deduct-

ing plus one-fourth diopter from the cycloplegic finding (to allow for the distance at which the test is made). There is absolutely no ground for supposing that any eye is damaged or weakened by having its accommodative efforts for various distances reduced to the normal amount required of a truly emmetropic eye.

It is not argued here that most children need glasses. But many more would be benefited by proper glasses than are discovered by visual tests in the public schools. In some cases the need for wearing glasses may be of relatively short duration, because the physical condition makes a refractive error more noticeable now than it will be later, under more favorable conditions of general health. In many other cases the need will prove permanent, although the prescription may have to be revised every year or two. The amount of ametropia may be very moderate and yet important. Take the case of a schoolboy of twelve years, who, having obtained glasses two years earlier on account of blepharitis and photophobia, has lately complained that he cannot go for an automobile ride without becoming nauseated and even vomiting; and who also states that he feels better with his eyes closed. His previous glasses were right +0.12 sphere +0.50 cylinder axis 10 degrees, left +0.12 sphere +0.50 cylinder axis 175 degrees, and until recently these were worn constantly with comfort. Under cycloplegia he accepts at the five-meter range right +0.12 +0.62 cylinder axis 10 degrees, left plus 0.12 sphere plus 0.62 cylinder axis 175 degrees; and he is given for constant use (after deducting 0.25 sphere to allow for the range at which the test was made) right —0.12 sphere +0.62 cylinder axis 10 degrees, left —0.12 sphere +0.62 cylinder axis 175 degrees. Three weeks later his mother reports that the boy was entirely relieved by his new glasses, and that he has done a lot of automobile riding without inconvenience. The patient is a tall, rather well built boy of pale complexion, a keen student, and rather moderately interested in outdoor sports.

This is a somewhat extreme example, in a delicate, rapidly growing boy who is apparently tending from hyperopia toward myopia, by way of mixed astigmatism. In this case it would have been easy to declare at the preliminary examination (which did not differ materially from that under cycloplegia) that the change of refraction was not enough to account for the symptoms. Yet, as the outcome clearly demonstrated, such a statement would have been hasty and erroneous. In childhood the question of prescribing glasses must often be considered with just as much deliberation and just as careful technique, as well as with just as much willingness to give the patient the benefit of the doubt by prescribing the proper correction, as in the adult.

W. H. Crisp.

THE AMERICAN BOARD FOR OPHTHALMIC EXAMINATIONS

The American Board for Ophthalmic Examinations has been in operation for fourteen years, and during that time has issued certificates to nearly nine hundred ophthalmologists. Such certification, together with the incidental examinations, is playing an important part in the development of ophthalmology in this country, but it is only one part of the work originally contemplated for the Board. A more far-reaching function will be the definite standardization of ophthalmic teaching. Much preliminary work is necessary before effective steps can be taken in this direction, and the corrective influences of time and even of what may be termed experimentation will be called into play before adequate processes are developed.

Excellent groundwork for advance was laid by the very comprehensive report on the teaching of ophthalmology presented to the International Congress of Ophthalmology at Amsterdam last year; and recent action by the American Board for Ophthalmic Examinations indicates that it is prepared to study this new field of activity. The Board has lately decided not to admit

any candidate to examination until he has completed three years of preparation in ophthalmology, including formal course of study, interneship, and time spent as assistant or in independent private practice.

It is obviously difficult for the Board to take the initiative in investigating the various courses of instruction in ophthalmology given at different institutions, but it is anticipated that such institutions will invite this survey, at least to the extent of submitting all necessary information and asking for a report and classification.

Much will be gained if those who wish to study ophthalmology can be furnished with collective information as to the courses of instruction which are available, and if they can be advised exactly what is regarded as adequate preparation for practice in this special field of medicine and surgery.

E. C. Ellett.

TRANSIENT MYOPIA AND THE MECHANISM OF ACCOMMODATION

Helmholtz' theory of accommodaton has been recently challenged as to its consistency with the origin of transient myopia in diabetes, in arsenobenzol intoxication, following ocular trauma, and in asthenia.

In a lengthy article on this subject, A. Hudelo (Archives d'Ophtalmologie, 1930, volume 2, pages 20-95) suggests that the assumption of a ciliary spasm in transient myopia is not justifiable for the following reasons: (1) Transient myopia is not affected by the use of atropin. (2) It is not accompanied by the frontal headaches which are characteristic of ciliary spasm. (3) Diabetes, arsenobenzol poisoning, traumatism, and asthenia are generally causes of paralytic and not of spastic conditions. But, according to the classical theory of accommodation, paresis of the ciliary muscle should result in an effect similar to presbyopia and not in a myopic change.

Hudelo believes that in human eyes accommodation is a dual process controlled by the antagonistic action of the circular and anteroposterior portions of the ciliary muscle. According to this hypothesis, a contraction of the circular fibers of the ciliary muscle is responsible for near accommodation, while distance accommodation is accomplished through a contraction of Brücke's muscle. Hence, toxic or traumatic paralysis of the latter muscle will result in temporary "spasm of accommodation" or transient myopia.

Hudelo quite fails to mention that it was the physiologist Nicati who first (Physiologie oculaire, Paris, 1909) applied this theory of the dual mechanism of accommodation to the pathogenesis of temporary myopia. Neither does Hudelo make any reference to the work of Sédan, who expressed similar views in 1922 (Marseille Médicale, 1922, volume 18, pages 871-874).

M. Beigelman.

BOOK NOTICES

Refraction of the human eye and methods of estimating the refraction, including a section on the fitting of spectacles and eyeglasses. By James Thorington. Second edition, revised, octavo, 406 pages, 322 illustrations, 28 colored. Cloth, $2.00. 1930, P. Blakiston's Son and Company, Philadelphia.

In spite of some imperfections (and what book has none?) this volume must be regarded as one of the most important modern textbooks on refraction in the English language. After several large reprintings of the first edition, which was originally published many years ago, the second edition is sure of a wide circulation. It is neatly and durably bound, and of convenient size for frequent reference. The print is clear, the illustrations abundant and for the most part very well applied to their respective purposes. The descriptions of principle or technique are not always perfectly comprehensible in themselves, but will usually be grasped by one who studies carefully the accompanying illustrations. Revised forms of earlier apparatus are illustrated and described, as in the case of the ophthalmometer, the luminous

ophthalmoscope, the trial frame, and certain recent tests. A concession is made to the noisy claims of a group of lecturing quacks, by a detailed description of the so-called "ocular gymnastics", "ocular calisthenics", or "ocular daily dozen". These maneuvers, frequently assumed to avoid the manifestations of asthenopia and the need for glasses, probably serve chiefly the purpose of diverting the patient's attention from his real or fancied ocular discomfort and from the desirability of having his refraction determined in an expert and painstaking manner. Their serious recommendation in a textbook on refraction probably depends upon the fact that if a fool shouts long and loudly enough there will be some who think him wise.

Although this second edition claims to contain the newest methods of procedure, it is distressing to find that the author pays altogether inadequate attention to Jackson's cross cylinder test for the strength of the astigmatic error, and no attention whatever to the use of the cross cylinder in testing for the astigmatic axis; although these tests have been given detailed description in the periodical literature, and although those ophthalmic physicians who have thoroughly learned to use the axis test with the cross cylinder are universally of the opinion that it effects great economy of time in refraction work, and that it produces results more precise and more reliable than those obtained by any other method. The strength test with the cross cylinder is dismissed in a paragraph whose chief result is to suggest that the author does not understand the technique involved; while the more important axis test is not even mentioned. This is a serious oversight in such a volume.

W. H. Crisp.

Stereoskopischer Atlas der äusseren Erkrankungen des Auges, nach farbigen Photographien (Stereoscopic atlas of external diseases of the eye, from colored photographs). By Karl Wessely, professor in Munich. Section 2, plates 11 to 20. In cardboard case, price 12 marks. Published by J. F. Bergmann, Munich, 1930.

This is the second of the projected series of six sets of stereophotographs in color of diseases of the external eye. (see American Journal of Ophthalmology, April, 1930). In this set of ten pictures are the following:

11. Mottled iris. Mild squamous blepharitis.
12. Phlyctenular conjunctivitis.
13. Epibulbar dermoid.
14. Anterior scleral staphyloma.
15. Fistula of tear sac.
16. Ulcus serpens.
17. Ulcus serpens after cauterization with steam.
18. Splinter of iron in the iris.
19. Facial lupus with cicatricial ectropion.
20. Dislocation of the globe.

Particularly good are those illustrations dealing with the grosser lesions in which color and stereoscopic vision play such an important rôle in the recognition of disease. But here, as in the preceding set, the grain of the paper interferes somewhat with detail where minute lesions have to be recognized. Notwithstanding this minor defect, the series bids fair to play an important part in academic teaching, and represents a most commendable and painstaking effort. *Harry S. Gradle.*

Saggi di Oftalmologia (Ophthalmologic essays). From the Clinica Oculistica in Rome, directed by Professor Q. Di Marzio. Fifth volume, 1929. Large octavo, paper covers, 653 pages, illustrated, price not stated. Rome, Tipografia Poliglotta "C. di M.", 1930.

The twenty-nine scientific papers here published furnish in themselves an extremely creditable record of work accomplished in an Italian public institution. The individual papers will be abstracted in the American Journal of Ophthalmology. They cover a variety of subjects, from a discussion of the results obtained by radiotherapy in eye diseases, written by the director of the clinic, Di Marzio, with the aid of Salvatori, to Baumgart's essay on the bac-

teriologic condition of the conjunctiva in dacryocystitis before and after operation. The volume closes with a statistical record of the work of the Clinica Oculistica of Rome for the scholastic year 1928-1929. The clinic apparently welcomes graduate students on a fellowship basis, as four such students are mentioned with the titles of their theses. The clinic performed 857 operations during the year, these operations being distributed among the various assistants (sixteen in number) so that each one will obtain a sufficient operative experience. Trachoma is treated in a separate department of the clinic.

W. H. Crisp.

Diseases of the Eye. By Charles H. May. Thirteenth edition, revised. 444 pages, 374 illustrations, including 23 plates, with 73 colored figures. Cloth, price $4.00. William Wood and Company, New York.

The thirteenth edition of this well known and excellent manual of diseases of the eye has been thoroughly revised and brought up to date by the author. A number of additions have been made, including six pages on the slit-lamp and corneal microscope. The manual continues to fulfill its original purpose of presenting to the student and general practitioner in concise form the fundamentals of ophthalmology.

Phillips Thygeson.

United Fruit Company, Medical Department, eighteenth annual report, 1929. Card covers, 451 pages, illustrated. General offices of the company, Boston.

This volume is naturally in the main a group of miscellaneous reports of activities in the department of tropical medicine. It contains a statistical account of the diseases of the eye encountered in Honduras, while the other papers possessing some interest for the ophthalmologist include a report of a case of gonorrheal conjunctivitis, in which the author, L. R. Fletcher, concludes that ice cold irrigations have given more rapid results in the treatment of this condition than those obtained with any other method; and a report on some cases of night-blindness in railway section laborers who had been living on an improperly restricted diet, and whose condition improved rapidly under large doses of cod liver oil and plenty of fresh milk. A prominent place is occupied by discussion of recent methods of treating malaria, a topic of some interest in view of the recent application of artificially produced malaria to the treatment of neurosyphilis.

W. H. Crisp.

CORRESPONDENCE

A school device for preventing myopia

To the editor:

Though stooping over or reading close is admitted as a potent cause of myopia, so that schools have adopted the "hygienic" combined table (sloping) and chair (with straight back), yet I have not heard of any direct device to avoid excessive approximation of the pupil to work. With this view, I have devised a chin-bar, consisting of a horizontal strip of multiple-ply wood, the ends of which pass lengthwise through holes (at different heights to suit children of different ages and heights) in two more or less vertical strips fixed at an angle to the sides of the sloping desk by a bolt and nut. This "chin bar" is tightened in a position such that the chin rests lightly on it and cannot come down closer then 30 or 35 cm. from the desk. It prevents the child from resting his head directly on the desk, or looking from underneath the chin bar at his books at close range. It is a very simple device which can be fitted to the existing class room desks at a very low cost, amounting here to four per rupee (about one dollar per dozen). Since its use (about a year), I have observed in a few cases under me (including my younger sister) the apparent arrest of the rapidly increasing myopia.

Calcutta, India *B. K. Wadia.*

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education and history

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1. GENERAL METHODS OF DIAGNOSIS

Hughes, W. L. **Stereoscopic photography as applied to the eye.** Arch. of Ophth., 1930, v. 3, May, pp. 583-587.

In this paper the author recommends the use of stereoscopic photographs of the eye for clinical records and describes a very ingenious range finder acting through a 1.5 mm. opening in the main shutter, screened by a small green filter. The apparatus is so arranged that the filter is thrown to one side at the instant of exposure, again taking its place at the end of exposure. The author prefers the Drüner camera, as the picture is made under oblique illumination with this instrument.

M. H. Post.

Zamenhof, A. **Intrinsic fundus shadows.** Ann. d'Ocul., 1930, v. 167, April, pp. 285-301.

Three means of observing relief exist: parallax, binocular vision, and the shadows cast by oblique light rays. In this article the possibilities of fundus diagnosis by shadows are considered. Illumination must be from a source other than direct. Such gross phenomena as shadows from interior opacities and strands in the vitreous are first considered. Then the author describes the more difficult task of observing shadows of slightly elevated vessels and the exudate just anterior to the retina. (Eight observations and six stereoscopic pictures.)

Lawrence T. Post.

2. THERAPEUTICS AND OPERATIONS

Bernea and Segaller-Miron. **Practical conclusions on the technique of asepsis and antisepsis in eye operations.** Ann. d'Ocul., 1930, v. 167, April, pp. 315-318.

In the absence of conjunctivitis or disease of the tear passage the eye should be considered aseptic, and all attention before operation should be given to cleansing of the lids and sterilization of instruments.

Experiments of Rydley and Frederick suggest that the asepsis of the conjunctival sac is probably due to an enzyme contained in the tears. The usual preoperative irrigations cause epiphora thus diluting the tears and lessening their antiseptic action. Atropine is of value, because, in paralizing the sympathetic, it produces a diminution in the quantity of tears and an increased concentration of the enzyme.

Lawrence T. Post.

Campos, Edilberto. **Temporary paralysis of the facial nerve for intraocular operations.** Annaes de Ocul. do Rio de Janeiro, 1929, v. 1, Oct., pp. 17-18.

Since 1927 the author has used this method in all intraocular operations,

with great satisfaction. The technique consists of an injection of 0.5 to 2 c.c. of novocain-adrenalin solution (Terrien) in the region of the facial nerve at the point where it emerges from the stylomastoid foramen. The author never has had any permanent ill effects from these injections. The paralysis usually clears up within an hour or so and rarely lasts over one and a half hours. *Hugo Lucic.*

Fox, L. W. **Causes of failure in ophthalmic operations.** Arch. of Ophth., 1930, v. 5, June, pp. 695-703.

The various causes of failure cited by the author include endogenous and exogenous infections; in cataract extraction too small a corneal section, retained lens cortex, and excessive loss of vitreous; in glaucoma placing of the incision or the trephine opening too far forward. *M. H. Post.*

Guist, Gustav. **A speculum for intraocular operations.** Zeit. f. Augenh., 1930, v. 70, March, p. 392.

Arruga has modified Olah's speculum by adding a spur to which a bridle suture can be attached. Guist has so modified this instrument that it can be used for either eye. In the old form it was different for each eye.

F. H. Haessler.

Krasso, Ilona. **Experimental and histological studies on the effect of a single radiation with Bucky's border rays (Grenzstrahlen) on the eye of the normal rabbit.** Zeit. f. Augenh., 1930, v. 70, Feb., p. 237.

Bucky's border rays are electromagnetic oscillations of about two Ångström units. Eighty-eight percent of their energy is absorbed by the skin at a depth of three millimeters, while only ten percent Roentgen-ray energy is absorbed under the same conditions. In sufficient dosage, necrosis of the superficial one-third of the substantia propria of the cornea occurred, which is a necrobiosis and is followed by complete restitution. The harmful dose of Roentgen rays is very much smaller and yet produces a necrosis which results in ulceration, which may be complicated by iritis. The effect is not dependent only on the quantity of energy absorbed.

F. H. Haessler.

Krasso, I. **The treatment of afflictions of the anterior segment with Bucky's border rays.** Zeit. f. Augenh., 1930, v. 71, April, p. 1.

The treatment was successful in radiation of eyes afflicted with herpes corneæ, recurrent corneal erosion, vesicular keratitis, keratitis filamentosa, keratitis dendritica, keratitis punctata superficialis, acne rosacea, infected erosion, superficial infiltrates, ulcers, episcleritis, and scleritis. With a modification of technique, the author believes that she might have attained permanent cures in cases where improvement had been only temporary. The therapeutic results are as good in each case as one usually sees in treatment with ultraviolet, radium, or roentgen rays. The advantages are brief time of radiation; painlessness and safety of the treatment; a shortening of the course of the disease, the possibility of repetition of treatment, because the effect is not cumulative; and simplicity and accuracy of dosage with an inexpensive apparatus. *F. H. Haessler.*

Meller, J. **The treatment of detached retina by means of ignipuncture.** Zeit. f. Augenh., 1930, v. 70, Feb., p. 207.

Since 1925 Meller has operated forty-one eyes in thirty-nine patients by means of ignipuncture with permanent cure in twelve percent of the eyes. The cured cases are reported in detail. He punctures the sclera directly with a hot cautery and withdraws it instantly. This method leaves only a small white circular scar, less than one disc diameter wide, as compared with the very large protuberant scar of the more protracted cauterization. With the instantaneous method it is almost impossible to include the edge of the retinal tear in the cauterization. Serious intraocular hemorrhage is a possible complication of the operation,

and Meller is unable to say whether it is greater with his lightning-like puncture than with more deliberate cauterization as practiced by Lindner.

F. H. Haessler.

Meyer-Waldeck, F. **Yatren.** Klin M. f. Augenh., 1930, v. 84, May, pp. 703-704.

A four percent solution of yatren is recommended as an efficient disinfectant of the whole corneo-conjunctival sac. Even in epithelial defects, eczematous affections, and ulcers of the cornea, it is without deleterious influences such as have been observed after the application of rivanol. The burning sometimes complained of may be prevented by a two percent cocain solution to which 0.35 percent phenol is added to increase its anesthetic action.

C. Zimmermann.

Salvati, G. **A new proceeding for the correction of cicatrical entropion.** Ann. d'Ocul., 1930, v. 167, April, pp. 311-314.

The operation is described, but unfortunately the four illustrative photographs are too indistinct to be of any value. *Lawrence T. Post.*

Subileau, J. M. **Hemoaspiration and trepanning with the aid of an electric burr in the practice of dacryocystorhinostomy.** Ann. d'Ocul., 1930, v. 167, April, pp. 301-306.

The difficulties of the operation of Dupuy-Dutemps and Bourguet are hemostasis, and the long duration of the procedure. The electric instrument for sucking out the blood, and the dental burr for cutting the bony window, solve these difficulties. The instrument is described in detail and is illustrated. *Lawrence T. Post.*

3. PHYSIOLOGIC OPTICS, REFRACTION AND COLOR VISION

Fischer, V. B. **Eye contour a visual factor.** Arch. of Ophth., 1930, v. 3, no. 4, April, pp. 413-418.

The eye is inferior to many optical instruments in the matter of color aberration. Lenses can be made with one convex element of crowned glass, more convergent for blue than red, and a concave element of flint glass, more divergent for blue than red. Thus, by the use of the proper component of each, their dispersive power can be neutralized. But the constant changing of the refractive power of the human lens makes any such arrangement impossible. This defect is somewhat overcome by perception and by the limitation of sensitivity to color to a small portion of the retina.

The hollow contour of the retina increases the visual angle, permitting ready discernment of movement well outside the line of vision. The high curvature of the cornea increases the light gathering power of the eye, further increased by the especially great amount of curvature of the central portion. Thus we see the eye is peculiarly adapted to collect light coming to it from wide angles. Were the retina flat, it would need to be out of all proportion in order to intercept all rays entering the eye, and the diffusion circles at the periphery would be immensely greater. The spherical shape of the eye permits it to move easily in all directions, so that the fovea may be brought with facility into proper relation with all objects in the visual field. *M. H. Post.*

Freeman, Ellis. **The extent of the field of vision in lens micropsia.** Arch. of Ophth., 1930, v. 3, March, pp. 331-334.

Micropsia apparently results in a reduction of the size of objects. It can be produced by any means which interfere with the normal relation between convergence and accommodation. Minus lenses accomplish this most easily. The reduction in size cannot be due to reduction in the size of the retinal image, which has been shown to be only one-thirtieth with minus three diopter lenses. It must be due to the apparent nearness of the object without corresponding increase in size. It is also well recognized that chromatic saturation is increased and that there is a heightened distinctness

of detail. But that the field of vision is changed is disproved by the author's experiments. He mapped the field of vision both with and without the reducing lens and found practically no change either with 5 by 5 mm. black squares on a white ground with similar white spaces between them or by an L-shaped test object capable of rotation on its axis, the observer being required to state its position when first appearing in the field of vision. An objective measure of micropsia may be sought in color and intensity equations.

M. H. Post.

Jackson, Edward, and O'Rourke, D. H. **Practical accuracy and convenience in trial lenses.** Jour. Amer. Med. Assoc., 1930, v. 94, Jan. 11, pp. 81-86.

The authors hold that the sale of lenses under copyrighted names which are made with curves that have never been published, and must be tested by special instruments put out by the manufacturers, is becoming a nuisance and a menace. The accuracy needed for laboratory investigation is far different from that needed in the consulting room. However, the biconvex and biconcave, the worst possible form of trial lenses, are still most commonly used for spherical lenses. The meniscus form is admittedly the best form, but for a trial case a complete set of meniscus lenses is not practical. Therefore, for practical accuracy, a set of plano trial lenses is offered and recommended. Detailed specifications for such a set are given. These lenses can be used with a light steel wire frame, which has no scale indicating the direction of the cylinder axis. This is to be read from a large protractor, with a scale four inches in diameter, which also makes for accuracy. The effective and convenient manner in which several lenses may be combined in this type of frame is illustrated. The advantage of using supplementary lenses for instantaneous changes is pointed out and emphasized.

Lens strength should be measured from the anterior surfaces. There is no need to correct lenses "clear to the very edge", as the observations of Fischer show that the head is moved as soon as the eye rotates twelve degrees in any direction. It is pointed out and illustrated by a figure that even with a 14 D. convex lens, placed obliquely twenty degrees and more, practical accuracy of focal correction and vision can be obtained with a plano lens, equal to that claimed for the highly specialized and copyrighted lens. No perfectly accurate trial lens, wholly to avoid the effects of looking through it obliquely, is possible. The nearest approach to accuracy can be made only by calculations based on a certain strength of sphere and cylinder required, a certain distance of the object looked at before the eye, the position of the center of rotation in the eye, and the distance of the lens in front of the eye. A certain lens, calculated for vision at one distance, cannot be best for another distance, and no possible trial set of such lenses would exactly suit the two eyes of the same patient. Plano lenses meet all the requirements of practical accuracy.

George H. Stine.

Lagrange, H. **Retinal adaptation.** Ann. d'Ocul., 1930, v. 167, May, pp. 406-426.

This is a general discussion of the mechanism and adaptation of the retina to light, color, etc., beginning with an historical sketch of the development of the ideas about it. Each important contribution is related and to a certain extent considered. The subject is technical and the article does not lend itself to abstracting, for it is already a concise abstract of the work of many individuals. The original should be read by those interested.

Lawrence T. Post.

Lewitsky, M. **On the technique of measuring the near point of accommodation.** Zeit. f. Augenh., 1930, v. 71, May, p. 152.

The author has constructed a piece of apparatus which consists of a millimeter rule mounted horizontally on a stand. On the rule a slider is mounted which holds the objects of fixation. A second sliding rule, with a pair of

wires mounted on a frame, allows one to measure the distance between the corneal apex and the zero point of the apparatus. The apparatus is so adjusted that the two wires and the apex of the cornea lie in the same plane.

F. H. Haessler.

Pillat, Arnold. **Similarities in the eyes of single ovum twins and "mirror image symmetry" of certain characteristics.** Zeit. f. Augenh., 1930, v. 71, April, p. 35.

In a pair of single-ovum twins Pillat observed a great many characteristics of eyebrow, lid, epicanthal fold, and tear duct that were similar, as well as astigmatism which was of equal magnitude and axis in the same eye of each individual. Both had internal strabismus and the eyes of one were the mirror image of the other, in that one individual fixed with the right eye and one with the left, and in each individual the deviating eye was more myopic than its fellow, was amblyopic, had a larger cornea with a corresponding radius of curvature and corneal refraction, and had a conus down and temporally. *F. H. Haessler.*

4. OCULAR MOVEMENTS

Adler, F. H. **Reciprocal innervation of the extraocular muscles.** Arch. of Ophth., 1930, v. 3, March, pp. 318-324.

That the law of reciprocal innervation holds good for the extraocular muscles was proved by Sherrington when he produced adduction of the right eye of a monkey, after the third and fourth nerves had been destroyed, by stimulation of that portion of the cerebral cortex known to produce conjugate deviation of the two eyes to the left. The inward rotation could only be due to reciprocal diminution of tone of the still active external rectus. But the value of this experiment has been questioned because of the abnormal condition following section of the third and fourth nerves. De Kleijn made graphs showing reciprocal innervation during artificially produced nystagmus by connecting the external and internal recti directly to recording levers.

The author presents two cases giving clinical evidence in support of the law of reciprocal innervation as applied to the muscles of the eye. In the first case there was complete paralysis of the third nerve and probably the fourth, yet when the right eye was turned outward there was slight inward rotation of the left, and vice versa. In order to insure complete paralysis of the interni, one c.c. of a two percent procaine hydrochloride solution was injected along the right internal rectus muscle. The result was the same. The second case presented similar phenomena in the left eye. The right was normal. No injection of procaine was made. This reaction was more marked in the second case, which was seen much sooner after the onset of paralysis than the first one, and in which, therefore, secondary contraction of the antagonist had not yet taken place. *M. H. Post.*

Castresana, Baldomero. **Surgical treatment of convergent concomitant strabismus.** Rev. Cubana de Oft. y Oto-Rino-Larin., 1930, v. 2, no. 3, March, p. 188.

The first essential is to decide whether we are dealing with a true strabismus or not. Usually the visual line does not coincide with the center of the cornea, but, passing to its inner side, subtends an angle arbitrarily called "alpha". Variations in the amplitude of this angle can closely simulate actual strabismus. The fixing power of each eye must, therefore, be tested separately; if upon removing the screen there is a perceptible movement of the eye back into its line of sight, actual strabismus is assured.

The concomitant deviations appear early in life, and without diplopia. Either eye can deviate to a uniform degree and is then dropped from consciousness. The paralytic type of strabismus is usually of recent development, and its appearance is accompanied by diplopia, vertigo, etc., and its deviating angle varies as the eye moves into or away from the field of action of the involved muscle. In old paralyses there may be contractures

of the antagonistic muscles which maintain the deviating angles approximately the same. Inasmuch as the diplopia is here disregarded, its diagnosis is at times difficult.

Before deciding upon surgical intervention, attempts should be made to reeducate the deviating eye, after accurate correction of its ametropia. The cases not likely to receive aid from the various orthoptic exercises are: (1) those less than six years of age, or more than twenty-eight; (2) those showing more than forty degrees of convergence, or any divergence; (3) those having less than 0.2 visual acuity in the deviated eye; (4) those with a false macula; (5) those with paralysis or tendinous retraction; (6) those incapable of ocular correction; (7) those who do not have the time to devote to the necessary exercises; and (8) those who either from unwillingness or mental torpidity refuse to cooperate.

The author's technique is described with a series of illustrations. He first weakens the antagonist by partial section, then advances the defective muscle to the limbus with three silk sutures, leaving the ends long. These ends are then fastened to the face by means of adhesive. *A. G. Wilde.*

Falta, M. **A physiological relation between the centers for convergence and lateral deviation of the eyes.** Zeit. f. Augenh., 1930, v. 71, May, p. 160.

In binocular fixation convergence is stimulated only by similar images on both retinæ. If one covers one eye, the center ceases to function. It is this fact that explains the deviation of the covered eye in the familiar screen test, the deviation not being due to the usually assumed defect in muscle balance. When convergence is in abeyance the covered eye deviates outward conjugately with the fixing eye which is deviating nasally. The alternation of the functioning of the centers for convergence and for conjugate motion is easily induced. *F. H. Haessler.*

Schurr, C. G. **Compression of the head, causing temporary sixth nerve paralysis.** Brit. Jour. Ophth., 1930, v. 14, May, p. 231.

A child, aged four years, whose head was caught in the trellis-work of a lift, developed a swollen face and a convergent left eye. The reporter observed the child two weeks after the accident. At that time there was a complete internal rotation of the left eyeball; no other pathology. The eyeball could be rotated barely to the middle line. Under gradual exercise, in time the child could rotate the ball to the external canthus. The eyeball persisted in converging, however, which was probably due to stretching of the left external rectus. The author believes that the correct treatment would have been to fix the eye with a suture in full outward rotation to prevent stretching, had the patient been observed as soon as paralysis was discovered. *D. F. Harbridge.*

Vannas, Mauno. **Fixation suture in advancement.** Klin. M. f. Augenh., 1930, v. 84, May, pp. 691-697.

The thread for fixation is placed, like the bridle suture in cataract extraction, under the antagonist of the muscle to be advanced, and is tied in the middle part of a brace, consisting of a spatula which is fastened vertically in front of the eye on the forehead, cheek, and nose by adhesive plaster. It proved very successful in ten cases.

C. Zimmermann.

5. CONJUNCTIVA

Cowan, Alfred. **Subconjunctival injections of Pregl's solution in gonorrheal ophthalmia.** Arch. of Ophth., 1930, v. 3, March, pp. 325-330.

Gonorrheal arthritis has been treated in the Philadelphia General Hospital since 1925 by the injection of Pregl's solution, with excellent results. This work suggested the use of subconjunctival injections of Pregl's solution in gonorrheal conjunctivitis. The procedure was to flush the eye with boric acid, then to instill one percent holocain hydrochloride, and finally to inject fifteen minims of Pregl's solution under the conjunctiva at its most edematous point. This treatment was repeated daily until negative cultures had

been obtained from the laboratory on three successive days. At the same time cold compresses were used for ten minutes every hour, except in the presence of corneal ulcers. A 1/10,000 solution of sodium oxymercury orthonitrophenolate was dropped in the eye as often as necessary to check the secretion. Atropine sulphate, one percent, was used to maintain mydriasis. And one percent solution of silver nitrate was applied daily to the everted lids. When sent home the patient was given zinc sulphate one-fourth percent.

Six cases are reported which cleared up in an average of 6.5 days. Thirteen days was the longest, three the shortest. Useful vision was retained in all but one eye. *M. H. Post.*

Nicolich, Merida. **Maritime theory of trachoma, and its fundamental etiological facts.** Arch. de Oft. de Buenos Aires, 1930, v. 5, no. 2, Feb., p. 53.

The author, having noted certain peculiarities in the distribution of trachoma in the district near Malaga, Spain, has constructed a map of the world, showing those portions where the disease is most prevalent. Trachoma is shown to involve especially the shores of all continents, and the adjacent low plains connected therewith.

Nicolich believes there are two methods for diffusion of the disease: first, by direct transfer of the infecting agent in the discharges from one person to another, and second, by indirect channels. On account of the high incidence among fishermen, or those connected with that industry, he believes the infecting agent has some connection with the sea, and suggests the possibility of an extrahuman cycle of development in fish. *A. G. Wilde.*

6. CORNEA AND SCLERA

Fuchs, Ernst. **Localization of pathological changes in the cornea.** Arch. of Ophth., 1930, v. 3, no. 5, May, pp. 588-598.

Localization, or the predilection of endogenous infections for certain structures in the cornea, is frequently not understood. To study this question, the author has suggested that localization may be distinguished according to depth in the cornea, surface location, and histological structure involved. In the development of this subject, the author goes into detail concerning the various conditions found. He first discusses the embryological development of the cornea and the bearing of its growth upon its diseases.

Under chemism, he considers such conditions as argyrosis and gold staining, noting the affinity of the different tissues for different stains. Here he also touches on the deposit of lime salts forming the calcareous film known as arcus senilis. Also, anaphylaxis of the cornea is ascribed to chemical change in the corneal tissues. The chemism of the cornea is most active in the epithelium. It absorbs water, but does not give it up on pressure. Distilled water injected into the anterior chamber results in desquamation of the endothelium, sometimes with permanent opacity. Isotonic salt solutions occasionally produce similar results in irrigation of the anterior chamber following cataract operation, because of which the author has abandoned their use entirely. The cornea has no definite lymph streams, but the cool temperature of the external layers results in a flow of fluids from the inside out. The greatest nutritional influences arise at the limbus from the blood supply located there.

Mechanical disturbances are dependent upon the structure and the location in the cornea. Here the influence of fluids and intraocular tension are taken into consideration. The nerves of the cornea lie in the superficial layers and their pathology, therefore, results in dystrophies of these strata. They are of special interest in relationship to the nutrition of the epithelial cells. Finally, the influence of the lids is noted with regard to the behavior of the cornea and in regard to desiccation, calcareous deposits, arcus senilis and pannus. An explanation is given of the currents in the anterior chamber, with the usual picture of descemetitis resulting as a consequence of these cur-

rents. It is also noted that interstitial keratitis possibly involves the posterior layers of the cornea, because the infectious process is borne to the cornea through the aqueous. *M. H. Post.*

Ptashnick, D. B. **Iontophoresis and its use in corneal lesions.** Arch. Oft. (Russian), 1930, v. 7, pt. 2-3, pp. 210-221.

The author used Birnhäuser's technique of iontophoresis (Klin. Monatsbl. für Augenheilk., vol. 67) in twenty-three cases of corneal leucomata. At least thirty to forty applications are necessary in order to bring about a definite improvement. In the author's experience the use of iontophoresis for the treatment of corneal opacities has given encouraging results even in cases where other methods had failed completely. *M. Beigelman.*

Shoji, Y. **Remarks concerning a pigmented reticulum on the posterior surface of the cornea.** Arch. d'Opht., 1930, v. 47, March, p. 129.

A pigmented reticulum was found with the slit-lamp upon the posterior surface of the cornea of a patient aged sixty-four years who had had a cataract operation. There was no connection between the reticulum and the iris, although the former occupied the pupillary area, and several strands of pupillary remains were present on the iris underlying the reticulum. The condition is considered as a congenital anomaly due to faulty development of the pupillary membrane as there were no traces of inflammatory reactions. The article is accompanied by an exhaustive review of the literature and eleven figures, two of which are in color. *M. F. Weymann.*

Toulant, P. **Vaccinal keratitis.** Arch. d'Opht., 1930, v. 47, April, p. 229.

A woman, aged thirty-two years, got some vaccine in the left eye while working with vaccine tubes. Four days later a small ulcer was found near the limbus with no infiltration. It was quite deep in its center. Atropin and chloramine were used. The eye became more painful with involvement of the iris. Within three weeks the ulcer was entirely epithelialized, but the patient had several recurrent attacks of iritis which were quite painful. Attention is called to the shorter incubation period of the virus in the cornea, in this case four days. This patient had had two successful takes within the last two years, but a general immunity does not seem to protect the cornea.

A review of those cases described in the literature is given, and the seriousness of this infection is illustrated by the fact that several eyes were completely lost. The treatment is that usually used for ulcers and iritis, and it is well to use an antiseptic to prevent secondary infection. The prophylaxis is more important. Those doctors administering vaccine should wear glasses, but if vaccine gets into the eye one should immediately instill a one or two percent solution of silver nitrate. *M. F. Weymann.*

7. UVEAL TRACT, SYMPATHETIC DISEASE AND AQUEOUS HUMOR

Hoffmann, W. H. **Choroiditis in latent disease.** (Leprosy) Jour. of Tropical Med. and Hyg., 1929, v. 32, Nov., p. 328.

The author describes a case of latent leprosy in which a choroiditis developed similar in type to that found in tuberculous choroiditis. He considers this focal affection of the choroid to be due to the leprous process, but not as a direct reaction of the tissues to the specific germ. He believes it is an allergic process, produced by the toxins of the Hansen bacilli in other parts of the body; such a process occurs in many instances of tuberculous choroiditis. *Maurice Marcove.*

Lukovski, T. A. **On the therapy of tuberculous choroiditis.** Arch. Oft. (Russian), 1930, v. 7, pt. 2-3, pp. 198-210.

In the treatment of tuberculous choroiditis tuberculin is of distinct value. Its disadvantages are: the difficulty in establishing the proper therapeutic dose, and the possibility of untoward

focal reactions in lesions of the macula and in cases with a tendency to intraocular hemorrhage. The author has seen good results from the use of creosote, particularly in promoting the absorption of tuberculous exudates. Subconjunctival injections of dionin are also advocated, because of their action as a lymphagogue. *M. Beigelman.*

Puscariu, Elena. **Some considerations concerning sympathetic ophthalmia, investigations concerning its pathogenesis and a report of two personal cases which were cured.** Arch. d'Opht., 1930, v. 47, March, p. 142.

In discussing the literature, attention is called to the fact that true sympathetic ophthalmia is quite a rare condition. The various theories as to its etiology are discussed with the conclusion that the problem still remains to be solved. The treatment recommended is local use of atropin and adrenalin, subconjunctivally if necessary, subconjunctival injections of five percent salt solution, and smoked glasses. The general treatment consists of arsephenamin, mercury cyanide, and urotropin intravenously; and milk intramuscularly. In one of his more severe cases an abscess of fixation was produced by the injection of 1 c.c. of turpentine, after which the disease took a favorable turn. The writer believes that sympathetic ophthalmia is not as destructive a process as we have imagined it to be, provided energetic treatment is instituted early and followed vigorously.

M. F. Weymann.

8. GLAUCOMA AND OCULAR TENSION

Friedenwald, Jonas S. **The pathogenesis of acute glaucoma: I. Clinical and pathologic study.** Arch. of Ophth., 1930, v. 3, May, pp. 560-573.

Necrosis of the pupillary margin of the iris appears to be due to pressure sufficient to cause collapse of the capillaries of the region affected. Ordinarily the pressure in the capillaries exceeds that of the intraocular pressure by an amount equal to the osmotic pressure of the plasma proteins, which is about 25 mm. of mercury. But should the plasma proteins pass through the capillary walls in any large area, the intraocular tension might easily rise to within 2 or 3 mm. of the intracapillary pressure, resulting in destruction of the normal capillaries not so affected. Examination has shown evidence of such a condition in cases of acute glaucoma.

The author presents eleven cases showing edema of the ciliary body with hemorrhagic serous and fibrinous extravasations, with no lesions of the larger vessels. Such injury to the capillary walls might result from three conditions: (1) venous stasis, (2) vasomotor disturbances, and (3) some capillary poison in the tissues. The first of these has not been substantiated by experiment. There is insufficient knowledge with regard to vasomotor control to exclude the second of these. Chemosis of the lids and conjunctiva, frequently met with following successful operation for acute glaucoma, is suggestive of a toxic factor. The author removed aqueous from such an eye and injected it beneath the skin of the forearm, where a definite reaction occurred. This same substance should lead to increased permeability of the walls of Schlemm's canal with resulting hypotension. Such a fall has been noted following the successful use of miotics lasting from six to twenty-four hours. From these observations, the author believes a vasotoxic substance to be present in acute attacks of glaucoma.

The further questions then arise: Is the capillary lesion the cause or the result of the increased tension, and is the lesion in the ciliary capillaries the sole cause of the hypertension? The answer to these questions has been sought through animal experimentation, the result of which will be given in a second paper.

Such lesions do not occur except in the presence of acute exacerbations of hypertension, for though similar lesions have been found throughout the entire uvea following the continued hypoten-

sion resulting from leaking wounds, no such lesion was found in a case of sudden dislocation of the lens with acute rise of pressure.

The author agrees that swelling of the ciliary body and processes blocking the filtration angle is responsible for the production of acute glaucoma, and such hypertension will continue as long as the filtration angle remains occluded.

The miotics, eserin and pilocarpin, act favorably not only in producing contraction of the ciliary muscle, but also in causing contraction of the ciliary arteries. *M. H. Post.*

Friedenwald, J. S., and Pierce, H. F. **The pathogenesis of acute glaucoma. II. Experimental study.** Arch. of Ophth., 1930, v. 3, May, pp. 574-582.

Histamin, known to produce paralysis of the capillary walls and increased permeability of the endothelium, was injected into the anterior chamber, vitreous and ciliary body of various animals, after which histologic examinations were made at varying intervals. It was found that changes were produced in the ciliary body and processes similar to those found in acute glaucoma, but less severe and more widespread than in acute glaucoma. The tension rose rapidly, but soon sank below normal at the same time that intense edema of the conjunctiva and cornea took place. The fall in tension occurred synchronously with the entrance of the drug into the anterior chamber. Finally, the tension again rose to slightly above the normal, probably the result of the accumulation of large amounts of serum in the aqueous. *M. H. Post.*

Heimann, E. A. **The basis for physical and dietetic therapy of glaucoma.** Zeit. f. Augenh., 1930, v. 71, April, p. 82.

Heimann believes that glaucoma is a local edema resulting from a pathologic permeability of the blood vessels. This vascular permeability results from a disturbance of equilibrium of the sympathetic innervation of the vessels. The glaucoma patient is "angioneurotic". There are analogies with migraine, though migraine and glaucoma are in no way identical. The toxic substances which may disturb the delicate equilibrium may be metabolic products, hormones, or poisons directly absorbed, such as alcohol and nicotine. Heimann uses massage, exercise in the form of sport, avoidance of psychic insult, and a diet free from alcohol, caffeine, smoked meat, vinegar, pepper, and mustard, with very little salt. He urges much raw fruit and vegetables, and frequent small meals.

F. H. Haessler.

Kiep, W. H. **A modification of Lagrange's operation.** Brit. Med. Jour., 1929, v. 2, Aug. 24, p. 341.

The author considers the Lagrange operation an excellent procedure, but its technique is quite difficult. He proposes, therefore, a simpler method, which is as follows: The conjunctival and subconjunctival tissues are incised 6 or 7 mm. above the limbus, and if the capsule of Tenon is prolonged as far forward as this it should be included likewise in the flap. This flap is dissected down to within 1.5 or 2 mm. of the corneoscleral margin. A groove is cut in the sclera itself at a distance from 2 to 2.5 mm. from the limbus with Tooke's cornea splitting knife. A keratome is inserted into this furrow and pushed into the anterior chamber as in the method of a Heine cyclodialysis, except that the incision should be about 3 or even 4 mm. from end to end. The keratome should be withdrawn as rapidly as possible to prevent or lessen the loss of aqueous. The anterior lip of the scleral wound can now be easily gripped with Elliot's disc forceps and a small piece exsected by de Wecker's scissors. The small portion of the iris which usually prolapses is excised, a strictly peripheral iridectomy being aimed at.

If the operator has been successful in his efforts thus far, he will have lost little aqueous and will have an uncollapsed anterior chamber. The conjunctival flap is then gently stroked upward, and, by gentle pressure on the

corneal surface of the limbus in the region of the iridectomy, the iris is caused to resume its normal relationships. The conjunctival flap is secured with one suture. Should the iris not have prolapsed of its own accord, its periphery should be gently withdrawn and a pinhole iridectomy performed. This will cause a greater loss of aqueous, but the anterior chamber should not be completely collapsed. If the iridectomy is a purely peripheral one an iris repositor will not be needed, for simply stroking the surface of the limbus will suffice to restore the normal relationships.

The following advantages are claimed for this modification: (1) It is possible to do this operation with the minimum disturbance of the intraocular structures and the minimum risk of intraocular hemorrhage. Cases of acute congestive glaucoma with a shallow anterior chamber should be treated beforehand. (2) In a large proportion of cases it is possible to do the operation without causing complete collapse of the anterior chamber. This is due to the valve-like nature of the fistula (as opposed to the rigid circular foramen obtained by trephining. (3) The thickness of the membranous covering is a more effective safeguard against late infection than is possible to secure in cases of corneoscleral trephining. Moreover, the fistulous orifice is situated not at the corneoscleral margin, but at a distance of 2 mm. or even more from it. (4) Should, for any reason, a fibrosis ensue on this operation (as indeed may follow on any form of sclerectomy), a repetition of the operation may be performed without detriment.

One illustrative case is reported.

George H. Stine.

Kronfeld, Peter C. **The behavior of the intraocular tension after puncture of the anterior chamber in glaucoma.** Zeit f. Augenh., 1930, v. 71, April, p. 48. (See also Arch. of Ophth., 1929, April, p. 450.)

Puncture of the anterior chamber is recommended for the reduction of intraocular tension in various conditions. In order to determine whether puncture is really indicated in these conditions, whether it gives the results expected of it, and in the hope of throwing new light on the glaucoma problem, the author performed this operation seventy-four times. The technique is apparently simple and in no cases were there any ill effects. In glaucoma simplex the tension falls to zero with the puncture and immediately rises, so that in less than two hours the tension is greater than before. The curve of tension is quite characteristic and consists of three phases:

1. The restitution of tension to its former height (usually in forty minutes when a normal eye still has tension of 10 to 12 mm.).

2. The phase of reactive relative tension increase.

3. The phase of reactive diminution of tension. Phase 3 is not a common phenomenon.

In cases of glaucoma simplex in which the tension has never been found to be above the limits of normal the same cure is obtained. This is also true of the apparently normal eye of a patient whose other eye is afflicted with frank glaucoma simplex, even though this normal eye has normal optic disc and normal field. As a control test of this phenomenon, the author punctured eyes free from glaucoma but afflicted with other diseases of the fundus or iridocyclitis, and always found the tension to follow the curve of the normal eye. This is important since in other respects a glaucoma simplex eye behaves like an inflamed eye.

Lindner and Thiel have demonstrated by different methods that in eyes with glaucoma simplex and in iritis there is increased permeability and increased fluid exchange. After puncture of the anterior chamber the tension of these two kinds of eyes behaves differently. Therefore, at least a third factor must be effective in glaucoma simplex. Because puncture is not a procedure that can be freely repeated, it is difficult to furnish proof that the curve of tension is constant and not in-

fluenced by time of day, size of pupil, local and general vascular reaction, or adaptation. However, in a number of cases in which the procedure was repeated once after four weeks to five months the curves were identical. It certainly is highly probable that the phase of reactive increase in tension is a constant and essential finding in the glaucoma simplex eye.

The procedure, therefore, has value in the differential diagnosis in cases of glaucoma simplex without rise of tension or pseudoglaucoma with coloboma of the optic nerve. It is essentially a provocative test which gives results that are more nearly unequivocal than Thiel's caffeine test, which gives rise to only minimal increases of tension, or the homatropin test which is usually negative in glaucoma simplex.

The test gives no indication of the stage of glaucoma. In fact, the curve of an eye with almost extinct vision was identical with that of the fellow eye in which the vision was normal. In glaucoma absolutum the tension returned to its prepuncture level most rapidly and the reactive increase of tension was most marked.

No data on the effect of drugs are given here. Operations which produce an effective fistula need not be considered since a satisfactory fistula allows practically limitless quantities of fluid to leave the eye. In a single instance of cyclodialysis he found that the curve was brought almost to normal, except that a slightly emphasized reactive phase of increased tension points to a slight insufficiency of the drainage of the eye.

In three cases of chronic inflammatory glaucoma the curve was similar to that of glaucoma simplex. It is possible that in those cases of glaucoma in which a single acute attack is the only manifestation of the disease, we are dealing with a secondary glaucoma. Puncture of the anterior chamber may help to differentiate this type from true glaucoma. After puncture in hydrophthalmos the tension is restored very slowly, which is the reason for the success of the procedure as a therapeutic measure.

If one attempts to interpret the significance of this study, it seems clear that in glaucoma simplex the active components in the production of intraocular tension preponderate over the channels of fluid overflow more than in the normal eye. Kronfeld emphasizes this because the last expression of opinion from the Leber-Seidel school declares a disturbance in drainage to be the only factor in the mechanism of glaucoma production. Among the author's cases there was one in which phase one was not accelerated. This he assumes was a retention glaucoma, and probably explains the misunderstanding between the Leber-Seidel school and its opponents by showing that most glaucoma simplex cases depend for their production on overactivity of the active components. The curves obtained with hydrophthalmos show it to be a retention glaucoma. In a case of cyclitic glaucoma there was evidence that it is also of the retentional type, and also that hyperemia of the uvea is a factor. If on repeated puncture one obtains the same curve characteristic of retention, the prognosis is bad.

F. H. Haessler.

Pimentel, Paulo C. **The pH value of blood in glaucoma.** Annaes de Ocul. do Rio de Janeiro, 1930, Jan., pp. 19-22.

On the theory that the cause of glaucoma might be due to some general constitutional factor, this author, following closely the work of Redslob and Reiss, undertook to demonstrate the relationship between the pH value of the patient's blood and the intraocular tension. Most of the seven cases presented showed a definite increase in the pH value. *Hugo L. Lucic.*

Rowe, A. W. **Endocrine studies. The etiology of glaucoma.** Arch. of Ophth., v. 3, May, pp. 403-409.

Thirty-one cases of glaucoma were studied from the regular service of the Massachusetts Eye and Ear Infirmary. The study of four cases was incomplete. Only one of the twenty-seven thoroughly studied cases was certainly endocrine. Twenty-four were definitely not so. The author feels justified in concluding, therefore, that this series

demonstrates the absence of endocrine disturbances as a significant factor in the etiology of glaucoma.

M. H. Post.

Wright, R. E., and Nayer, K. K. **The adrenalin pack in the treatment of glaucoma. It value in temporarily reducing the intraocular pressure.** Brit. Med. Jour., 1929, v. 2, Sept. 7, p. 456.

Over 100 cases of primary glaucoma were tested as to the efficiency of three newer nonoperative aids to the treatment of glaucoma, i.e. (1) the instillation of glaucosan drops, (2) the intravenous injection of hypertonic sodium chloride solution (30%), and (3) the employment of a pledget of cotton-wool soaked in adrenalin and placed in the superior fornix of the conjunctiva as advocated by Gradle, Gifford and others.

Glaucosan (levo- and amino-) was not of much value. The intravenous injection of hypertonic sodium chloride solution is a useful emergency measure, best employed in a hospital. The adrenalin pack was found to be a most useful and powerful adjunct in chronic primary glaucoma. It does not give constant results, but it will sometimes reduce the tension where intensive eserin treatment in combination with other measures fails. It is of great value in controlling tension prior to operation (which it is not intended to replace).

The method consists in placing a pledget soaked in 1-1000 adrenalin in the superior fornix (after holocain anesthesia) where it is allowed to remain for five minutes. There usually follows a preliminary rise in tension on the first eight hours, which may be obviated by frequent instillations of one-half percent eserin before and after the pack. The subsequent fall in tension may be sustained by eserin.

Six cases with illustrative charts are reported. *George H. Stine.*

9. CRYSTALLINE LENS

Elliot, R. H. **Some points in connection with cataract extraction.** Brit. Med. Jour., 1929, v. 2, Dec. 21, p. 1147.

Many factors must be considered in deciding the time of cataract operation in each individual case. Elliot does not hold the view that a cataract should not be operated as long as the other eye sees well; the aphakic eye, although it cannot be fitted with any glasses, is of great value in avoiding bodily injury. Age is an important factor in the success of cataract extraction; every additional year in an elderly person lessens the patient's resistance. However, much depends on the patient's state of health. One man may be old and worn out at fifty-five, while another is hale and hearty at seventy years and older. Hence, it is unwise to postpone operation indefinitely. No patient should be allowed to go blind and to drop his normal activities.

An immature cataract does not offer any peculiar risk. Hypermaturity of a cataract may bring definite risks to the eye, among which secondary glaucoma and slow iritis are the most frequent. The type of cataract in which secondary glaucoma is most to be feared is the one in which swelling takes place. It has a white shiny appearance, with mother-of-pearl sectors, and the anterior chamber is shallow; a brown lens with shallow anterior chamber is not above suspicion. The patient's morale for the operation is raised if there is some sight in the other eye. If the operative result in the first eye is good, the second eye should be operated, not only because of the added morale, but also because the first eye may be lost from a number of unavoidable causes. Two eyes are better than one, and a blind eye on one side is a distinct danger. Coloration of vision disappears only after the second cataract is extracted.

In the methods of operation the usual precautions are necessary. All foci of infection and sources of autointoxication must be excluded. The conjunctiva must be healthy and a preliminary iridectomy performed. A month later the cataract is extracted under a conjunctival bridge; by this method the section is soundly healed twenty-four hours after the operation. Secondary

cataract can be dealt with six weeks later. Elliot makes a point of allowing the patient to use the unoperated eye as soon as possible, as long as no pain or discomfort results.

Diabetes is no contraindication to operation as long as diacetic acid and acetone are absent in the urine.

"Human sympathy" is of great importance in advising the patient of his affliction. Cataracts vary in their rate of progression. The patient should not be needlessly frightened, or driven to quacks. Promises of results from operation are impossible; the most the surgeon can do is to indicate the probabilities.

Utmost freedom of activity should be allowed the patient prior to operation, as the ordinary use of the eye is not prejudicial. Nothing can arrest the advance of a cataract unless it be the exhibition of thyroid gland in suitable cases.

It is inadvisable for the patient to attempt to resume his ordinary activities for at least one month after operation. The eye must be protected from chills, especially from those due to winds. *George H. Stine.*

Kotlarevskaia, S. Z. **On congenital luxation of the lens.** Russkii Opht. Jour., v. 9, 1930, April, pp. 460-469.

Thirteen cases of congenital luxation of the lens are reported. The hereditary tendencies in this condition are of the dominant type. Spontaneous luxation of the lens is usually accompanied by other congenital ocular defects, such as aniridia or ectopic pupil. Cardiovalvular lesions are found infrequently in these cases.

M. Beigelman.

Simoes, Aristoteles C. **Electric ion therapy in treatment of cataract.** Annaes de Ocul. do Rio de Janeiro, 1930, v. 2, Feb., pp. 50-52.

This method of treatment is based upon the beneficial properties which iodin ions and calcium ions exert upon the incipient cataract. It consists in the application of a 0.5 solution of potassium or sodium iodide and a 0.25 solution of calcium chloride to the orbit. These solutions are used alternately. The negative pole is attached to the solution when this consists of the iodin salt, and the process is reversed in the case of calcium chloride. In this manner the iodin anion and the calcium cathion go to their respective positive and negative poles, thereby penetrating the eye. It has never been necessary, in the author's experience, to use over two milliamperes of current, always however being guided by the individual's resistance.

Baró in Spain and Cantonnet in France have both utilized this method with diverse results. Baró enthusiastically states that the majority of patients obtain good results. Some of his patients with vision amounting to 1/6 are entirely cured and the advanced opacity entirely disappears. In others, the advancement of cataracts is absolutely checked. Cantonnet on the other hand rarely claims any positive results. The author is not impressed with any beneficial results in advanced cases, but believes it worth trying in incipient cataracts. *Hugo L. Lucic.*

10. RETINA AND VITREOUS

Badeaux, François. **Reflections on the operative treatment of detachment of the retina.** Ann. d'Ocul., 1930, v. 167, May, pp. 383-387. In early cases of detachment—less than three months—if a tear can be seen, the operation of Gonin is advised. In late cases the proceeding used by Sourdille should be employed. Gonin lays very little stress on the general pathology of the patient and does not think prolonged rest in bed is especially valuable. Sourdille thinks that long rest in bed is important. He believes choroidal disease underlies the retinal tear. His operation consists in cautery puncture of sclera and retina and the subconjunctival injection of cyanide of mercury.

Lawrence T. Post.

Dominguez, D. D. **Concerning the pathology of retinal detachment.** Ann. d'Ocul., 1930, v. 167, May, pp. 388-403.

Sixteen cases of the author's and three others are described. The con-

clusion from a study of these is that detachment will not take place unless three factors are present: hypotony, degeneration and liquefaction of the vitreous, and retinal perforation.

Lawrence T. Post.

Fuchs, Ernst. **Classification of retinitis.** Arch. of Ophth., 1930. v. 3, April, pp. 393-402.

Retinitis may be classified from an etiological or anatomic standpoint. The first is probably preferable in the majority of instances, but the second reveals many points of interest. Considered from the germinative point of view, the author first deals with the epiblastic structure of the retina (composed of the three neurons) and secondly with the mesoblastic tissues.

The first neuron is made up of the rods and cones and their nuclei, and the granular or pigmented epithelial layer. Congenital lesions of this neuron appearing early are albinism, congenital hemeralopia, and Oguchi's disease. Others not noted until later are retinitis pigmentosa, retinitis albescens and senile degeneration of the macula. Acquired lesions include idiopathic hemeralopia due to pregnancy, alcoholism, and diseases of the liver; and the retinitides from exposure to the sun, x-rays, and Pregl's solution. Staphyloma of the cornea and softening of the eyeball may produce changes in this neuron.

The second neuron, comprising the inner granular layer, is affected by acquired diseases causing vascular changes, such as hemorrhages, transudation, and exudation. As a result the granules disappear, leaving cystic degeneration, especially in the anterior portion of the retina. The retina may separate into two layers in this neuron, especially where it has previously been adherent to the choroid. Transudation here may take the form of retinitis albuminurica, diabetica, and circinata.

The third neuron is composed of the ganglion cells and nerve fibers. The first change in this neuron is degeneration of the ganglion cells. Acquired changes in them may result from poisons, such as methyl alcohol, quinine, arsenic, etc. These cells die rapidly from loss of blood supply or section of their nerve fibers.

The nervous elements in all three layers are affected generally by abnormal development of the eye as microphthalmos and coloboma of the choroid, or crescentric atrophy about the disc. Underdevelopment of the macula is found resulting from a number of conditions, such as albinism or congenital nystagmus, with amblyopia as a frequent sequella. In such eyes the foveal depression, and, therefore, the foveal reflex, is often absent.

The mesoblastic tissue of the retina occurs only in the vessel walls and their lymph sheaths, and in much smaller quantity, in the branching cells of the third neuron. Lesions of the retina dependent on changes in the blood or in this mesoblastic tissue are Hippel's disease, disc-shaped degeneration of the macula, and retinitis of polycythemia or leukemia. Retinal disturbances can also be due to changes in the choroid, or other parts of the eye or body.

For simplicity, the author has dealt with the various layers and structures separately, but notes that rarely is the picture so simple. As a rule, it is complicated and intricate. *M. H. Post.*

Goldstein, L. and Wexler, D. **Acute tuberculous periphlebitis of the retina and optic nerve.** Arch. of Ophth., 1930, v. 3, May, pp. 552-559.

This lesion was described by Perls in 1873. In that case there was a cloudy cornea, with fresh nodular lesions on the surface of the iris. Miliary tubercles were found in various organs at autopsy. The iris contained caseating tubercles, and in the retina prominent submiliary nodules were found situated along the veins. This case suggested that the origin of periphlebitic disease followed previous infection in the anterior portion of the uvea, but it was disregarded from this standpoint in the literature.

Since 1914, numerous reports have confirmed the nature of the lesion and of hemorrhages dependent upon it. A case reported by the author is accompanied by numerous microphotographs

and confirms the earlier findings, that is, that the lesions are for the most part periphlebitic and are secondary to those in the anterior portion of the eye, a conclusion reached by the author from his observation that young fibroblasts and new capillaries in the anterior chamber indicate an effort at healing of the primary lesions, while no such change is present in the retina. *M. H. Post.*

Gonin, J. **Remarks and comments on 240 cases of retinal detachment treated for the most part operatively.** Ann. d'Ocul., 1930, v. 167, May, pp. 361-382.

Having previously described the technique of his operation and the results, in this article he discusses various phases of the subject. He first details the different kinds of vitreous opacities, giving his opinion as to those which are associated with retinal detachment. Next he considers hemorrhages. He believes they are frequently precursors of detachment.

A half dozen pages are devoted to tears. These he found in about ninety percent of his cases in which it was possible to see the fundus details, and in most of the remaining ten percent there seemed some especial reason for not finding them. He describes the kind of tears that occur.

A paragraph is devoted to chorioretinal lesions. Their existence previous to detachment is too frequent to be merely a coincidence.

Detailed description of the ophthalmoscopic appearance of the cautery wounds follows, and after this there is a discussion of the progress of detachments downwards and the reappearance of the detachments above after tapping the subretinal fluid from beneath the lower detachments.

Reestablishment of retinal function depends on the duration of the detachment and the age of the patient; the more recent the event and the younger the patient the better the prognosis.

Final paragraphs are devoted to some discussion of complications, chief among these being hemorrhage; strangely enough this usually occurs at about the sixth or seventh postoperative day. It usually clears. It occurred twelve times in 300 operations. Glaucoma occurred twice and orbital cellulitis once. *Lawrence T. Post.*

Pollnow, Leo. **Retinitis circinata and hole in the macula.** Zeit. f. Augenh., 1930, v. 70, Feb., p. 257.

The author describes his observations of six patients, and though he contributes nothing new, he gives an interesting summary of the characteristics of this uncommon disease. Retinitis circinata is seen usually in women in advanced years, and is associated with disturbances of circulation and arteriosclerosis. Hemorrhages are probably the basis of the white spots, while their appearance, disappearance, and confluence is characteristic. Vision is usually greatly reduced. There is a large central scotoma, but complete blindness rarely occurs. Though striking visible changes of the blood vessels are not observed, the variations in the white spots suggests that active circulatory changes in the retina and choriocapillaris are responsible for them. *F. H. Haessler.*

QUESTIONS AND ANSWERS

1. Iritis following extraction of cataract

Question: I operated on a sixty-five-year-old-lady for cataract three months ago. Careful physical examination previously, including cultures from the conjunctivæ, showed everything to be entirely normal. On the third day after operation, at the first dressing, much mucus was present in both eyes. The cornea of the operated eye was hazy and there was considerable pain. Cultures from the conjunctiva were negative. The bandages were removed, and local antiseptics and intravenous typhoid vaccine were used. The eye has slowly recovered, but there have been frequent attacks of pain, and there is obviously a low grade plastic iritis. There is a gray strand extending to the iris from the lips of the healed incision. The pupil is fairly well dilated to about 5 mm. but the pupillary space is occupied by a rather dense gray membrane. Pain is greatly increased by the use of levoglaucosan, obviously because of the pulling on the inflamed iris. The vision equals counting fingers at three feet. What therapy would you advise? Do you think that needling of the membrane at this time, thus permitting wide dilatation of the pupil, would be helpful?

Answer (from Dr. Hans Barkan, San Francisco): From your description, there has evidently been a plastic iritis present from the third day after your cataract extraction. The use of intravenous typhoid vaccine I think perfectly proper, although in a patient of the age of sixty-five years I have preferred the less strenuous method of milk injections. In spite of the negative cultures from the conjunctiva, the gray strand extending to the iris from the lips of the incision makes me feel that the infection probably was an ectogenous one. For the present therapy, the use of heat and the avoidance of draughts and cold is most essential. I do feel that heat would influence the pain. I am particularly partial to dry heat by therapeutic lamp, and ¼ grain doses of codeine four to six times a day on her bad days.

From your description I believe that this eye will quiet down completely in time.

At the time of needling, in order to secure better vision—which naturally should be deferred until six to nine months after the slightest evidence of irritation—I would use two needles so as to pull from the center toward the periphery, thus not exposing the ciliary body to any trauma. If the membrane be too thick for this maneuver, reopening the wound with a keratome and cutting through the membrane with the De Wecker scissors is a good procedure.

2. Motor field chart for industrial compensation cases

Question: I wish to make inquiries regarding the individual motor field chart as recommended by the American Medical Association's committee on compensation for eye injuries. I have been able to obtain the small cards for recording muscle function, but have not been able to get a large wall chart for actually recording the measurements. I should like to know where such a chart can be obtained. If not obtainable, please advise me as to the size of the chart for any given working distance so that I may construct one.

Answer (from Dr. Nelson Miles Black, Milwaukee): I do not know of any chart that is on the market for testing muscle function. I use a plat outlined on the wall of my office four by five feet and divided into one foot squares to correspond with the recording chart. The patient is placed about two feet from the chart and with the head held rigid he turns his eyes to each square in the wall chart, and if diplopia is noted in any square it is recorded on the record chart.

3. Instruments as aids to refraction

Question: I would like your observation and experience as to the comparative value of the trial frame as com-

pared against a mechanical refractor such as put out by DeZeng and other optical concerns. In asking this information I do so with the idea of obtaining enlightenment from a reliable source.

Having used a trial frame for fifteen years and seeing others use the more modern refractors I am wondering whether I am overlooking modern advantages to be had in refraction.

Answer (from Dr. William H. Wilder, Chicago): My own experience with various mechanical refractors that I have tried has not been so satisfactory as to make me discard the regular trial frame in their favor. Possibly, if one becomes accustomed to the use of them they may save a little time, although I question it very much. The appliances are all too cumbersome and not flexible enough to suit the various cases seen.

I think the inquirer has not been making any mistake at all in sticking to his reliable old trial frames, with which he is able to do as good refraction as he can with any of these modern contrivances that cost him ten times as much. The simplest things are sometimes the most reliable and the best. It is the man behind the gun that gets the results.

NEWS ITEMS

News items in this issue were received from Drs. M. Paul Motto, Cleveland; G. Oram Ring, Philadelphia; and T. L. Terry, Boston. News items should reach **Dr. Melville Black**, Metropolitan building, Denver, by the twelfth of the month.

Deaths

Professor Theodor Axenfeld of Freiburg, died on July 29, after a severe intestinal operation.

Dr. John Bernard Ellis, Chicago, aged fifty-five years, died suddenly July thirtieth of coronary thrombosis.

Dr. Charles S. Means, Long Beach, California, aged sixty-four years, died June eighth of chronic myocarditis.

Dr. William F. Matson, of Denver, aged sixty-five years, died suddenly in Victoria, British Columbia, on August eleventh, while on a motor tour with his wife and daughter. Dr. Matson had practiced in Denver for twenty-four years, after graduating from the University of Iowa, then practicing for ten years in Illinois, and finally taking his eye, ear, nose, and throat training in Europe.

Miscellaneous

A pair of fake eye doctors, who escaped from Lincoln after they had sought to swindle William Ason out of $600 for a so-called operation for cataract, were recently apprehended in Minneapolis. Their method was to pour gelatin into the conjunctival sac of the patient, and then to remove this substance pretending that it was the cataract.

In the British Journal of Ophthalmology for July, Ernest Thomson calls attention to the fact that the primary meaning of the word "prothesis" is "a place in a church on which the elements for the eucharist are put previous to their being placed on the altar", and that the word "prosthesis" is more correctly used for the purpose to which both words are ordinarily applied in surgery. As a matter of fact the two words have entirely distinct Greek origins, as any of our readers may confirm by looking them up in Webster's Collegiate Dictionary. Mr. Thomson also suggests that the word "proptosis" is incorrectly pronounced by most people, inasmuch as (according to his statement) it is made up of the prefix "pro" and the word "ptosis". In this regard Mr. Thomson is perhaps not entirely accurate, as our word "proptosis" is directly taken from the Greek word "πρόπτωσις", in which the accent is on the short "o"; and is not formed, as he suggests, from a combination in English of the prefix "pro" with the expression "ptosis".

The regular issue of the Annali di Ottalmologia e Clinica Oculistica contains several pages of personal invective against Di Marzio, the present incumbent of the chair of ophthalmology at the Clinica Oculistica of Rome; apparently based upon the fact that Professor Cirincione, some time before his death, was displaced by Di Marzio, who is said to have circulated unjustifiable criticism of his predecessor and former teacher. The anonymous author concludes by referring to Di Marzio as successively socialist, liberal, bolshevik, democratic, fascist, etc.

At the Geneva meeting of the international union against trachoma, Professor Pascheff of Sofia, Bulgaria, proposed certain laws as to the character of true trachoma. These laws may be stated as follows: There is no true trachoma without follicles. The chronic trachomatous follicles, by their confluence, give rise to granulations. Thus, true trachoma is a hyperplastic, follicular, chronic, confluent conjunctivitis. The follicles and

the granulations develop particularly in the culs-de-sacs, but also on the tarsus, the bulbar conjunctiva, and (most important) on the corneal limbus, giving rise to follicular pannus. True trachoma evolves spontaneously toward cicatrization or hyalin degeneration.

Societies

The sixteenth meeting of the Hispano-American Ophthalmological Society will be held in Santiago, Spain, September 15 to 18, 1930.

The eighth annual summer course in ophthalmology and otolaryngology given under the auspices of the Colorado Ophthalmological Society and the Colorado Otolaryngological Society was held in Denver from July 28th to August 9th. Demonstrations and clinics were held from 8 to 10 a.m., lectures from 10 to 12 and 2 to 5 o'clock. A round table luncheon was held each day in which everyone was invited to ask and answer questions; and these discussions were universally pronounced to be very interesting and profitable. Two operative clinics were held at the Colorado General Hospital. The invited lecturers on the ophthalmological program were: Dr. Jonas Friedenwald, Baltimore; Dr. Alfred Cowan, Philadelphia; and Dr. Meyer Weiner, Saint Louis. The local men who participated in the ophthalmological program were: Drs. William M. Bane, Melville Black, William H. Crisp, William C. Finnoff, Edward Jackson, John A. McCaw, James M. Shields, and Richard W. Whitehead. Visiting and local physicians and their wives, after a drive in the mountains, attended a banquet served at the Motor Club country home, in Bear Creek Canyon, one hundred and fifty being there. The Colorado Congress of Ophthalmology and Otolaryngology was held on two days in the middle of the two weeks' meeting; papers being read by Drs. H. G. Merrill of Provo, A. B. Bruner of Cleveland, A. M. Lemoine of Kansas City, Jonas Friedenwald of Baltimore, Beulah Cushman of Chicago, and Roderick O'Connor of San Francisco, and also by Drs. Edward Jackson and Ralph W. Danielson of Denver. The total number of registrants for the summer course was fifty-five, and the total registration for the congress was one hundred and twenty-three.

Personals

Dr. and Mrs. Charles E. G. Shannon of Philadelphia spent the summer vacationing in Maine.

Dr. M. Paul Motto has been appointed senior instructor in ophthalmology at the Western Reserve University school of medicine, Cleveland.

Dr. Paul Sartain of Philadelphia took his annual summer outing on the continent, and will return late in September.

Dr. and Mrs. William C. Posey of Philadelphia spent the summer in their cottage at Watch Hill, Rhode Island.

Dr. Frederick J. Cady, Saginaw, Michigan, was elected president of the Saginaw Valley Academy of Ophthalmology and Otolaryngology, which was organized June sixth.

At the recent meeting of the American Medical Association in Detroit, the ophthalmic research medal was awarded to Dr. Frederick H. Verhoeff of Boston.

Dr. and Mrs. G. Oram Ring of Philadelphia left for Europe July eighteenth on the steamship Paris, and are to return about the middle of September.

James A. Hawkins, Ph.D., has accepted an appointment as associate professor of applied biochemistry in the department of ophthalmology of the Washington University school of medicine, Saint Louis.

Dr. W. L. Fox of Cleveland recently received from the War Department at Washington notification of his promotion to the rank of lieutenant colonel in the Reserve Medical Corps.

Dr. Ralph Campbell, former resident ophthalmologist at the Lakeside Hospital of Cleveland, announces the opening of his office in Lancaster, Pennsylvania. His successor at the hospital is Dr. Robert Swanson of Saint Paul, Minnesota.

Professor Silva of Mexico City has been appointed secretary of the public health service of Mexico.

Dr. F. Sallmann has been appointed director of the eye department of the Rockefeller Institute in Peiping, China, to succeed Dr. Pillat, who has returned to Vienna.

Professor Behr of Hamburg has been elected an honorary member of the Interstate Postgraduate Medical Association of the United States of America.

Dr. D. Alberto Vazquez Barrière has been appointed professor of ophthalmology of the faculty of medicine of Montevideo (Uruguay).

Dr. Roy B. Metz, associate professor in the department of ophthalmology at Western Reserve University school of medicine, Cleveland, recently returned from a six weeks' holiday in Deland, Florida.

Dr. Viktor Frühwald of the University of Vienna, as guest of honor recently at a banquet given by the Dallas Eye, Ear, Nose, and Throat Society, delivered an address on the value of roentgen rays in diagnosing sinus disease.

The changes in the faculty of the ophthalmological department in the medical college of the state of South Carolina include the appointment of Dr. Pierre G. Jenkins as lecturer in ophthalmology, and of Dr. Robert R. Rhett as instructor in ophthalmology.

Dr. Peter K. Olitsky reported on bacterium granulosis (Noguchi) at the meeting of the International Union Against Trachoma, held under the auspices of the Health Section of the League of Nations in Geneva.

It is reported that Dr. James L. Smith of Chicago has been appointed by Governor Emmerson as superintendent to the Illinois Eye, Ear, and Throat Hospital, to succeed Dr. Leo Steiner.